

AD&BIORESOURCES NEWS

THE MAGAZINE OF THE UK ANAEROBIC DIGESTION
& BIORESOURCES TRADE ASSOCIATION

ISSUE 58 WINTER 2024

adbioresources.org



MISSION BIOGAS

AD READY FOR TAKE OFF
UNDER NEW NET ZERO STRATEGY

**NET ZERO NEEDS THE GAS
GRID – CADENT**

**FARMS NEED AD – GEORGE
EUSTICE**

**AI 4 AD – THE FUTURE IS
SMARTER**

**ARE YOUR SCADA SYSTEMS
CYBER SECURE?**

**COSHH AND SPILLS
PREVENTION**

**BIOGAS IS A BUDGET
MULTIPLIER**



ADBA | NATIONAL CONFERENCE

11 DECEMBER 2024 | ONE GREAT GEORGE STREET, LONDON

AD: CRITICAL INFRASTRUCTURE FOR NET ZERO

Snapshot of AD sector

Type of Plant	No. of operational plants	Capacity
Non-Sewage AD Sector		
Electricity/CHP plants	427	497 MWe
Heat-only plants	6	0.4 MWth
Total	433	91,175 m ³ /hr
Sewage Sector		
Sewage treatment plants	120	2,156 MW _{biogas}
Sewage Biomethane plants	53	
Total	170	215 MWe
Total		
Electricity/CHP	584	713 MWe
Heat-only	6	0.4 MWth
Biomethane	133	103,174 m ³ /hr
Total	723	2,814 MW _{biogas}

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EDITORIAL:

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

Forward Features:

AD – Food chain decarbonisation. From farm to fork, the food chain is responsible for ~30% of global GHG emissions. AD is the key to delivering the net zero transition across all links in the chain, while serving to restore soil health, improve air quality and protect our waterways. Find out how farming, food production and food recycling can work for climate, the environment and people.

O&M: LDAR Leak detection and repair strategies to track down and prevent fugitive emissions.

EB-Net Corner: A Decade of Progress. Leading members of the network look back to the future, considering the great advances made in AD-related biotechnology and those that are on the horizon.

Health & Safety: Working in Confined Spaces a brief introduction & quiz
+ the latest round up of important policy, regulatory, association and member news

NB: If there is an issue you'd like to see explored – across the areas of policy, regulation, technology and operation – please contact me,
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Anaerobic Digestion and
Bioresources Association

TIME TO START CAPITALISING ON
THE NATURAL VALUE OF WASTE

AD - the methane solution that makes sense, writes **George Eustice**.

Many of the environmental challenges we face are best solved by allowing natural biological cycles to complete their course. Rather than fretting about waste in isolation, we need to change our mindset and view that waste as a resource to be harnessed. The essence of the circular economy espoused by government is not just that we should tackle the environmental challenges presented by waste created through human activity, but that we recognise its value which helps our economy.

Methane is one of the most potent greenhouse gases (GHG). While it is short lived in the atmosphere, reducing fugitive methane emissions is critical to a successful pathway to reaching Net Zero by 2050 and also to keeping 1.5 °C alive. In agriculture, the two most significant GHGs are methane, linked to the livestock industry, and nitrous oxide, which is emitted from soils and is linked to excessive nitrogen application.

The bad news is that the world is currently under-stating fugitive methane emissions from slurry stores on dairy farms. Research conducted by IFEAA in Cornwall has revealed empirical evidence which demonstrates that actual methane emissions from slurry stores is around 170kg per head per year, around four times higher than is currently assumed and declared in the UK's National Inventory using the Tier 2 methodology used by most countries.

This is a global problem with leading livestock producers like France and New Zealand declaring even lower emissions per head of livestock on their National Inventories despite having similar structures in their industry. Previously it had been assumed that most methane emissions from livestock were enteric, but this new research shows that the balance between the “manure component” and the “enteric component” could be closer to 50/50. That revelation has major implications for current policy assumptions.

The good news is that methane escaping from slurry stores on farms is relatively easy to capture and use and it has a value. A number of companies have worked out how to capture the methane, clean it and enhance it to a biomethane fuel. Some, like Bennamann in Cornwall, are using covers and a passive system to simply draw off the biogas as it leaves the surface of the store. Others, such as Qube and BioFactory are using small, modular AD technologies that can be deployed on farm in a cost-effective way to extract biogas from farm manure.

We are also seeing new potential for biomethane as a source of power. CNH Industrial, which manufactures New Holland tractors at Basildon in Essex, has pioneered new engine technologies and is building tractors that can run on biomethane. These have already been deployed by some progressive farm businesses.

Work is underway to eventually move from pressurised biomethane gas to a liquid form of biomethane which would significantly increase range. In addition, there is a new generation of smaller biomethane generators which can turn methane captured on farm into a source of electricity, either to be used on site or potentially exported to the grid.

The benefits of systems which capture and use biomethane extend to that other major fugitive emission from agriculture: nitrous oxide. Covering slurry stores to capture biomethane also prevents ammonia emissions, which is a major source of air pollution, and leads to a higher nutrient value in the residue that is left, meaning farmers can reduce their use of manufactured fertilisers by up to 30 percent.

Our natural environment is incredibly complex. Like a piece of mosaic art, if you focus too closely on an individual component part, it doesn't always make sense. By stepping back, the patterns and the picture becomes clear. By capturing fugitive methane from slurry stores on farms, we reduce half of our methane emissions from livestock, displace the need for fossil fuels like diesel from farm vehicles and also reduce fertiliser inputs saving money for farmers and cutting nitrous oxide emissions. It is an idea that epitomises the circular economy.

Rt Hon George Eustice, Former Secretary of State for the Environment and Chair of IFEAA (International Fugitive Emissions Abatement Association)

GASWORLD INTERVIEWS CHRIS HUHNE IN THE WAKE OF THE GENERAL ELECTION

Building on its strong relationship with gasworld, ADBA collaborated with global content editor Rob Cockerill to produce a 50-minute podcast discussing the UK's change of government. Released during Net Zero Week (www.netzeroweek.com) in mid-July, it was posted on both the event's and gasworld's platforms, attracting over 300 viewers.



TOP STORIES

Media coverage for ADBA this summer has been driven by events, including external ones like the General Election and those organised by ADBA, such as the Northern Ireland Conference in early September and the AD & Biogas Awards Ceremony in July.

UK media coverage saw two major peaks. The first was related to the general election results, where **ADBA's press release reacting to the new government** was featured by 11 outlets, reaching an audience of approximately 500,000. The second was driven by the **keynote speech from DAERA Minister Andrew Muir MLA at the ADBA Northern Ireland Conference 2024** on 4 September, which was picked up by 7 news outlets, with a combined reach of over 1.6 million.



The announcement of the **AD and Biogas Industry Awards 2024** was also widely covered. In particular, a press release by Award recipient Electrochaeta achieved international coverage amounting to an astounding 124.5M in total reach, including Germany and the UK, thanks to circulation via the AP Newswire!

ADBA also gained strong media coverage from the **Local Authorities site visits** in June. **BioteCH4** issued a press release about opening their Cambridgeshire plant to local officials, which reached 336,900 people through local media.

POLITICAL OUTREACH

Following the General Election ADBA welcomed key ministers to post and said it looks forward to working together to deliver the government's missions. Ministers contacted include;



- **The Rt Hon Angela Rayner MP**, Deputy Prime Minister and Secretary of State for Levelling Up, Housing and Communities
- **Ed Miliband MP**, Secretary of State for Energy Security and Net Zero
- **Sarah Jones MP**, Minister of State in the Department for Energy Security and Net Zero and the Department for Business and Trade
- **Rt Hon Lord Hunt of Kings Heath OBE**, Minister of State in the Department for Energy Security and Net Zero
- **Kerry McCarthy MP**, Parliamentary Under-Secretary of State in the Department for Energy Security and Net Zero
- **Miatta Fahnbulleh MP**, Parliamentary Under-Secretary of State in the Department for Energy Security and Net Zero
- **Michael Shanks MP**, Parliamentary Under-Secretary of State in the Department for Energy Security and Net Zero
- **Steve Reed OBE MP**, Secretary of State for Environment, Food and Rural Affairs
- **Daniel Zeichner MP**, Minister of State in the Department for Environment, Food and Rural Affairs
- **Mary Creagh CBE MP**, Parliamentary Under-Secretary of State at the Department for Environment, Food and Rural Affairs
- **Emma Hardy MP**, Parliamentary Under-Secretary of State for Environment, Food and Rural Affairs
- **Baroness Hayman of Ullock**, Parliamentary Under-Secretary of State for Environment, Food and Rural Affairs
- **Louise Haigh MP**, Secretary of State for Transport
- **Lord Hendy of Richmond Hill CBE**, Minister of State for Transport
- **Simon Lightwood MP**, Parliamentary Under-Secretary of State in the Department for Transport
- **Mike Kane MP**, Parliamentary Under-Secretary of State in the Department for Transport
- **Lilian Greenwood MP**, Parliamentary Under-Secretary of State in the Department for Transport

ADBA MEDIA ACTIVITIES – JUNE - SEPTEMBER 2024



2

Articles published in external outlets

1

Extensive response to media enquiries

6

Press releases issued

11.7M

Reach (excluding AP Newswire)

LINKEDIN IMPACT 110,290 impressions 585 new followers <https://bit.ly/3vLxQvq>

141

Member enquiries

48

Government engagements

39

Political stakeholder engagements

44

Industry and other stakeholder engagements

153

Operator engagements



THE CURRENCY OF STABILITY AND CONFIDENCE

The calm after the storm bodes well for biogas, says ADBA chairman **Chris Huhne**

At the time of going to press, the new government has been in post for around 12 weeks. Not long, when summer recess and conference season is accounted for. Essentially, the cabinet has been behind their desks for about four weeks.

Nevertheless, they have hit the ground running, delivering key elements of their Green Prosperity Plan, hinged on delivering 100% green energy by 2030. The plan dominated the King's Speech (see pages 10-14) and is being acted upon. In September, having increased the budget, the new government held the UK's sixth renewables auction which delivered a record breaking 131 clean energy projects, enough to power the equivalent of 11 million homes.

However, Labour's stance on two child benefit and the winter fuel allowance are perhaps surprisingly of equal importance. During the election campaign Starmer was acutely aware that the incoming government would not simply face the challenge of reviving Britain's stuttering economy and its struggling public services. It would have to rebuild trust in the very institution itself.

In this respect the style and manner of government is as important as the substance of the King's Speech. The issue is one of trust. Labour was elected on a painstakingly developed framework for growth, informed by a rolodex of advisory councils and committees made up of leading authorities from across the economy. The purpose? To deliver stability, to build investor confidence, 'to prioritise regional and local growth'. Trust is hard won and easily squandered.

Starmer and his chancellor Rachel Reeves are acutely aware of this. At the first whiff of weakness the carefully constructed coalition for growth will start to unravel. As it stands, the government has the support of most of business associations and investment funds. The UK Corporate Leaders Group sum up the consensus, "Net zero is a unique economic and political opportunity. The right policies, and bold political leadership, will allow leading businesses to go further and faster in their climate action. This will unlock the economic rewards

associated with the transition while safeguarding the future for our children and grandchildren."

After the austerity, Brexit and chaos of the Tory era, with its handbrake turns, doughnuts and reckless economic stunts, stability is the order of the day. It is the oxygen for investment. Hence Reeves' fiscal rectitude is to be applauded. It should pay dividends in the long run.

The government's focus is on bringing down interest rates, which will spark a virtuous circle; debt costs less, allowing the government to spend more on public services, investment becomes attractive, growing the economy, increasing tax revenues, giving the government more to spend. Our sector is certain to benefit.

Labour has recognised the need for low carbon flexible generation as part of its energy transition. On the role of gas in the power system, the government has indicated it will maintain a strategic reserve of gas power stations to guarantee security of supply. With gas still making up on average 30-40% of our power generation, it will be difficult to treat gas as a marginal fuel in the near term. So, the transition would need to be managed very carefully to avoid a further hiatus in investment in flexible generation necessary to keep the lights on.

Taken in conjunction with Defra being pressed to address pollution of our waterways and support farmers to boost Britain's food security, invest in carbon removal technologies and sustainable aviation fuel, the next five years represent a real opportunity for the biogas sector.

ADBA looks forward to working constructively with the new government on delivery of its Green Prosperity Plan. As we have long said, there is no net zero without biogas. The government has said it will pursue a mission-led approach to build back better. With luck and a following wind, we might now have an administration that will take a holistic view of the benefits to energy, climate and food security that our sector can deliver.

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GGSS TARIFF INCREASES FAIL TO ADDRESS UNDERLYING CAPEX INFLATION

Following the Annual Tariff Review (ATR) for the Green Gas Support Scheme, tariffs across all three tiers were increased, payable as of October 1. The following regime will now apply:

- Tier 1: 6.69 p/kWh (up from 6.09 p/kWh)
- Tier 2: 4.16 p/kWh (up from 3.90 p/kWh)
- Tier 3: 3.88 p/kWh (up from 3.45 p/kWh)

While the increases represent a step in the right direction the new rates will not be enough to justify new build AD plants in isolation from other policy changes.

Cost Pressures: Acknowledged But Not Fully Addressed

ADBA is encouraged that the ATR summary acknowledges the cost pressures faced by our members, noting “increases in labour, consumables, and maintenance costs”. This recognition is crucial. However, the tariff increases, all below 13%, do not fully compensate for these rising costs, particularly the 15-18% CAPEX increase we reported.

Feedstock Challenges: Recognised But Solutions Needed

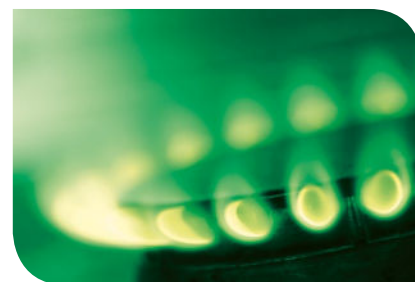
The government has taken note of our concerns regarding feedstock availability and associated costs. The ATR summary echoes our message, stating that

“respondents cited problems with availability of feedstocks, as well as associated costs, including transport, remaining high whilst revenues have fallen”. While this recognition is important, we eagerly await concrete measures to address these challenges.

Industry Attractiveness: A Shared Concern

We're pleased that the government has acknowledged our assessment of the decreasing attractiveness of AD development. The ATR summary reflects our view, noting that “respondents indicated that overall, the attractiveness of developing anaerobic digestion capacity has decreased in the last year and that tariffs are set too low”. This alignment in perspective is crucial for future policy developments.

ADBA will continue to engage with the government to press for further support for our industry. We believe that the AD sector has a crucial role to play in the UK's journey to net zero, and we require a policy framework that fully recognises and supports this potential.



UK ETS ON WASTE REQUIRES A SHARPER FOCUS TO DELIVER NET ZERO GOALS

Proposals to expand the UK Emissions Trading Scheme to cover waste received a mixed but cautiously positive reception from ADBA. While the overarching goal of reducing greenhouse gas (GHG) emissions is welcomed, there are concerns about the specific impacts on the waste industry, particularly in relation to waste-to-energy plants and landfill operations.

ADBA's feedback to the consultation, which ran either side of the General Election (May-August) emphasised the critical role of anaerobic digestion (AD) in achieving the UK's decarbonisation goals. We welcome recognition in the consultation document that “where waste does occur, we need to manage it in the most resource-efficient way possible. After waste prevention, priority goes to preparing waste for reuse, recycling, and then energy recovery (in that order). Disposal for example in landfill or incineration without energy recovery, is generally regarded as the worst option.”

Improved waste separation

We strongly advocate for prioritising AD within the waste hierarchy, especially for organic waste. AD not only reduces emissions from rotting food and farm wastes but also produces low carbon biofertilisers and green gas, contributing significantly to the UK's carbon reduction efforts.

To achieve these wide-ranging benefits, we emphasise the critical need for improved waste separation, particularly for organic waste. This approach aligns with future requirements for separate food waste collection and reinforces our view that AD serves as an efficient recycling method. Better and enhanced separation ensures that organic waste is diverted to AD facilities, maximising both energy recovery and nutrient recycling.

A major co-benefit of better separation is the consequential reduction in food waste, as this has a greater carbon benefit than recycling organic waste

through AD. Separating organics also improves the quality of recycling by reducing contamination and increasing capture rates.

For non-recyclable wastes, we recommend using advanced conversion technologies (ACTs) to produce recycled carbon fuels. This approach presents a more sustainable and preferred alternative to simple incineration, as it extracts higher value from waste materials and contributes to a circular economy.

Cautioning against perverse incentives

Whilst we support the inclusion of waste incineration facilities in the UK ETS, we caution against policies that might unintentionally encourage incineration over more sustainable alternatives. We stress that incineration should not be seen as the end goal for waste management, especially for organic waste that could be more efficiently processed through AD.

We caution against providing additional incentives for heat offtake from Energy from Waste (EfW) plants through the ETS. Such incentives could entrench reliance on EfW combustion plants, which we do not view as a sustainable long-term solution. Instead, we propose that all heat sources should be treated equally under the ETS.

The expansion of the UK ETS to the waste sector is a valuable opportunity to reshape and redefine our approach to waste management practices. By prioritising AD and other advanced technologies, we can develop a more sustainable, low-carbon waste management system aligned with the UK's net-zero ambitions.

ADBA remains committed to collaborating with the government and industry partners to develop and implement effective, sustainable waste management solutions that maximise carbon reduction and resource recovery.

ACCESS TO CO₂ NETWORKS WILL BOOST BIOMETHANE AND ACCELERATE THE CARBON REMOVALS MARKET

ADBA submitted a comprehensive response to the DESNZ's call for evidence for Non-Pipeline Transport (NPT) and Cross-Border CO₂ Networks, positioning the AD industry as a key player in the emerging carbon removals market and UK's journey towards Net Zero.

At the heart of ADBA's submission is the recognition of biogas as a significant potential source of negative emissions. ADBA argues that with proper CCS technologies and non-pipeline transport (NPT) in place, biogas plants could offer a readily available and efficient means of carbon removal. This is particularly relevant for rural and off-grid areas, where traditional pipeline infrastructure may not always be practical or cost-effective. ADBA emphasises that the AD sector, with its nationwide distribution of sites, represents a unique opportunity to generate negative carbon emissions and associated economic benefits across the UK, including more rural and disadvantaged regions.

One of the most prominent themes in the response is the call for equitable access to CO₂ transport and storage (T&S) networks. ADBA strongly advocates for fair conditions allowing smaller, distributed CO₂ sources to participate in CCS initiatives alongside larger, pipeline-connected projects. It also emphasised the need for diverse injection technologies capable of handling liquid as well as gaseous CO₂. This approach is essential for maximising the potential of the UK's diverse range of CO₂ sources and ensuring that the benefits of CCS are not limited to a select few large-scale emitters.

ADBA supports the development of a flexible and multi-modal approach to CO₂ transport: a system that incorporates road, rail, and shipping options. Allowing for adaptability to varying capture volumes, distances, and project sizes across different industries and regions is crucial. This flexibility can create a resilient and efficient CCS network that can accommodate the needs of diverse CO₂ producers, from small on-farm AD units to larger industrial facilities.

Integrating existing markets and infrastructure is another crucial focus of ADBA's response. The association calls for better alignment of NPT and CCS systems with current carbon markets, suggesting that biogas producers should be able to generate tradeable carbon allowances. The importance of ensuring compatibility with existing CO₂ shipping mechanisms used in industries such as food and beverage production was emphasised. Integration would streamline the implementation of CCS and create additional value streams for AD operators.

All of this is deliverable if the UK can fill the pipeline of specialist STEM-trained workforce needed. ADBA calls for increased investment in training programmes and STEM education to bridge this gap, arguing that addressing these shortages is essential for the UK to leverage its existing strengths in advanced manufacturing and large-scale infrastructure projects.

ADBA envisions a biogas industry positioned to play an important and multi-faceted role in the UK's CCS landscape and will continue to campaign for this.

ADBA CALLS FOR RAPID INCLUSION OF GHG REMOVALS IN UK ETS

In a further proposed amendment to the UK ETS (see p6 UK ETS on Waste), the government sought stakeholder views on incorporating greenhouse gas removals into the scope of the scheme. In its response, submitted on 14 August, ADBA welcomed the proposal as a potential gamechanger for the sector.

In our response, we advocated for early integration of GGRs into the UK ETS, ideally before 2027. This timeline would provide the certainty our industry needs and spur investment in carbon removal technologies. We strongly emphasised AD's unique environmental benefits, including waste management, methane emission reduction, and renewable energy and fertiliser production. We urged for these co-benefits to be recognised in any differentiation of GGR allowances.

We highlighted the need to support smaller-scale GGR operators, including small on-farm AD units, and suggested simplified methodologies and aggregation mechanisms to enable their participation in the UK ETS. For managing permanence risk, we supported a buffer pool approach over an equivalence ratio, arguing it offered greater simplicity, transparency, and flexibility. In addressing woodland units in the UK ETS, we stressed the importance of biodiversity. We proposed specific measures to ensure GGR projects, including AD, positively contribute to the UK's biodiversity goals.

If adopted, our recommendations could create new revenue streams for AD operators through GGR allowance sales in the UK ETS. We anticipated increased investments in AD technology, driven by clearer market signals, and greater recognition of AD's multiple environmental benefits beyond carbon removal. By offering multiple access points to the ETS allowances smaller operators should find it easier to participate in carbon markets.

SUSTAINABLE FARMING SCHEME: WHAT IT MEANS FOR BIOGAS IN WALES

The Welsh Government has recently released its response to the Sustainable Farming Scheme (SFS) consultation (<https://t.ly/ldZqi>). While the document doesn't explicitly mention biogas or anaerobic digestion (AD), there are several positive implications for our sector.

Firstly, the emphasis on sustainable land management and mitigating climate change aligns perfectly with the benefits that biogas plants and AD offer. The biogas industry promotes a circular economy and can significantly help farmers meet the Sustainable Land Management (SLM) objectives by producing goods and ecosystem services sustainably, while also effectively mitigating climate change.

The proposed Universal Actions and Optional Actions within the SFS could potentially support AD and biogas plants on farms. These technologies assist farmers in managing organic waste, reducing greenhouse gas emissions, and generating renewable energy – all contributing to the scheme's objectives. Additionally, the document mentions the formation of a Carbon Sequestration Evidence Review Panel. This presents an opportunity for our sector to advocate for including biogas and AD as effective carbon sequestration methods within the Universal Layer of the Scheme. The Welsh Government's commitment to working closely with farmers and stakeholders in developing the scheme is encouraging. As an industry, we should actively engage in this process through the Ministerial Roundtable and Officials Working Group to ensure that the benefits of biogas and AD are fully recognised and supported within the SFS.

The delay in implementing the scheme until 2026 provides us with more time to demonstrate the value of our technologies in achieving the SLM objectives. We should use this preparatory phase to highlight how biogas and AD can enhance farm efficiency, sustainability, and resilience.



NET ZERO NEEDS A GAS GRID AND GREEN GASES

The idea that it is easier to deliver net zero without a gas network is frustrating and unfounded. We must consider every option for a more sustainable future, writes **Dr Tony Ballance**.

Amid all the important discussion of decarbonising the UK's power system, we can often lose sight of the huge role gas networks play in delivering energy to people's homes, public buildings, businesses and industry.

Cadent is the largest gas network business in the UK, supplying almost as much energy as the entire electricity system, including the three largest cities in the UK – London, Birmingham and Manchester. We also work with big brands such as Rolls Royce, British Sugar and Liberty Steel. We manage a world-class network that spans 135,000 kilometres, operates at a reliability rate of 99.99 per cent, and that is modern, with over 75 per cent of the network having been installed in the last 22 years.

Our daily focus is to keep people warm while also protecting the planet, and we know that our network needs to change as we transition away from fossil fuels and towards sustainable alternatives.

The important task of delivering net zero in the energy sector is, however, often conflated with a discussion about getting rid of the gas network. This largely rests on the idea that electrification is the singular answer to net zero. The past year has seen discussions bubbling up around whether the gas network should be decommissioned entirely. Both the Public Accounts Committee and the National Infrastructure Commission have called for decommissioning plans to be produced.

The idea often presented – that it is easier to deliver net zero without a gas network – is frustrating and unfounded. No credible plan for replacing the electricity distribution system, which would give us a sense of how to even start this process, has been forthcoming. So, it is time to stand back and consider the role the gas network already plays and will need to continue to play.

The reality is that the pathway to deliver net zero remains uncertain; we need to keep open a range of options to help us get there. Regardless of the pathway we follow, our network will play a key role in decarbonising the power sector by storing gas in pipes and providing it to generate electricity when renewables are intermittent. Even picking one of the official scenarios where most energy is electrified (which may be very unlikely viewed from today), an estimated five million customers on our networks will still be using gas/methane at the start of the 2040s.

Gas grid futures

We need to be clear that, if we have that many customers still relying on gas, decommissioning is going to be very tricky, especially considering the reluctance from politicians to force people off their gas boilers, as recently confirmed by the new Prime Minister. Even with a small number of customers, the network will need to remain. And let's not forget how highly interconnected the gas network is – with a single pipe simultaneously supplying homes, local businesses, public buildings and industrial sites.

We must recognise that a gas network is going to be required for some time yet and look to ways in which the gas networks can play a key role in assisting decarbonisation. To do this, there are three key areas we should consider.

First, there is a compelling case for the adoption of hybrid heating systems, where a small heat pump is installed alongside a traditional gas boiler. Much of

the rest of Europe has adopted this approach as a means of accelerating the uptake of low-carbon electrified solutions. The Netherlands has been a pioneer in this space and has the most similar gas system to the UK, heating a similarly large proportion of homes with gas.

The benefits of hybrids are that they are lower cost than conventional heat pumps, are less disruptive and can drive down the demand for gas

by around 80 per cent (the gas boiler is only used for very cold days and to provide hot water), thereby significantly reducing emissions – and crucially, they can significantly reduce the scale and cost of upgrading the electricity distribution network. Perhaps the quickest and easiest way of decarbonising the electricity distribution system is for it not to have to tackle (peak) heating – instead give consumers electricity and gas.

Second, as gas networks we can drive down our emissions through proactively detecting leaks in our network with the latest technology, and then replace old iron pipes with newer plastic ones, which make the biggest difference to our already very low levels of methane leakage. This is something that is being done today in northern Italy and we have been working closely with our Italian colleagues to implement this in the UK.

Third, we can reduce the emissions of the gas we use by substituting methane for greener gases like biomethane – and in turn, hydrogen. Biomethane is derived from organic matter and offers a renewable alternative that can be seamlessly fed into the gas network. We already have enough biomethane connected to our network to heat 250,000 homes and believe this could increase to supply around two million homes (around 20 per cent of today's domestic demand). Again, there is more ambition in this space elsewhere in Europe.

Finally, in the background, we need to convert and develop the network to distribute hydrogen, providing low-carbon energy where electrification is either unfeasible or uneconomic. As we continue to replace old iron mains with plastic, the network will be 95 per cent ready by 2032 with limited retrofitting.

The gas network is one of the few pieces of UK infrastructure we can be truly proud of. It delivers an essential service keeping people warm and powering businesses and industry, with a world-class safety record. So why the seeming rush to get rid of it?

Instead of debating how soon we should start decommissioning our gas network, we should invest sensibly in it – and keep it at the forefront of driving innovation to simultaneously deliver gas at an affordable cost to consumers and help decarbonise our energy. We need to stop reducing something so intricate to a binary debate and move forward pragmatically.

Dr Tony Ballance is Chief Strategy & Regulation Officer at Cadent Gas Ltd



BIOGAS – THE BUDGET MULTIPLIER

The new government's direction of travel is promising for the biogas sector, writes **Giulia Ceccarelli**

On 5 July on behalf of ADBA, I was pleased to congratulate the Labour Party on their General Election victory and welcome the new Government into office. Labour's pledge to rebuild the country on net zero foundations, with an emphasis on tackling climate change through the rapid growth of renewables, made this an easy job.

Belatedly, we're finally seeing a plan for the net-zero regeneration many hoped for post-Covid, when there was a call to "build back better." While public finances remain tight and the funding isn't as robust as some might prefer, the government's direction of travel is clear and coherent.

Labour's focus on joined-up government, ensuring value for money across departments, is promising for our sector. AD plants, by turning organic waste into green energy—either power or heat—offer measurable climate, health, and environmental benefits in the process.

The ambition to deliver 100% green electricity by 2030 has made the headlines. Less noticed, but equally important, is the plan for gas power stations to provide mass balance. Ideally these will be using as much green gas as possible, in the spirit of the aspiration.



This aligns perfectly with Defra's goals. The new Secretary of State, **Steve Reed**, has tasked his department with creating a roadmap for the UK to become a zero-waste economy.

A zero-waste economy is one that seeks to maximise recycling, minimise waste, reduce consumption and ensure that products are made to be reused, repaired or recycled back into nature or the marketplace. The IEA says AD sits at the heart of the circular (recycling) economy.

Mr Reed has identified as priorities the cleaning up of Britain's rivers, lakes and seas, and supporting farmers to boost rural resilience and food security. As detailed in the last edition of AD&B News, AD has a leading role to play in stemming the crisis of nutrient overload blighting our rivers and soils and delivering food security.

In treating their organic wastes through AD to protect our waterways, farms would produce the heat to decarbonise their operations and support the transition to 100% green power; recycle the nutrients and minerals required to boost food security and restore our soils, and play a leading (and readymade) role in pioneering the pathways for the emerging market in carbon removals. Few industries offer the government a way to unlock climate, health, and environmental gains with simple and modest investment in a single technology. This is how departments can deliver more bang for their buck. The government is looking for a budget multiplier to stretch the public finances. Biogas is a perfect fit.



In the lead up to the elections, ADBA met with the then Shadow Ministers **Kerry McCarthy** (currently Minister for Climate) and **Daniel Zeichner** (currently Minister of Food Security and Rural Affairs). In these meetings,

Chris Huhne, ADBA's Chair, and I presented ADBA's 10-Point Roadmap (see page 14). This calls for targeted Government's support to address current barriers for growth and details how AD can address issues ranging from energy security and clean waterways to achieving net zero and providing diversified income streams for farmers.

We have asked for follow up meetings post elections, and we look forward to working with the new government and all relevant ministers across departments as Labour seeks to take the most efficient approach to delivering net zero.

To add to the good news, **Rachel Kyte** – who this July spoke at our World Biogas Expo & Summit in favour of AD – has been appointed as the UK's Special Representative for Climate, she will support ministers to increase senior international diplomatic engagement on climate and clean energy.



At the time of writing, we are a little under one month away from the Budget that will set out the government's spending and investment plans. Chancellor **Rachel Reeves** will deliver Labour's first Budget in 15 years on Wednesday 30 October. At the Labour party conference, Ms Reeves said it would be a budget for growth. We will be highlighting the value for money support for the biogas industry can deliver across different parts of the economy and environment.



For more information please contact External Affairs Lead **Giulia Ceccarelli** at giulia.ceccarelli@adbioresources.org

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MISSION BIOGAS



Labour won a landslide victory in the general election on 4 July, giving the new government a mandate to deliver its change manifesto. **Jon Hughes** considers what it means for biogas.

Following Labour's landslide victory in the general election, the new UK government is set to dramatically advance the country's green economy and support its sustainable financial industry, to boost investment in sectors like ours, 'related to clean energy and infrastructure'.

It has declared that climate, energy and food security are all individually issues of national security that must be urgently addressed. The government will be taking a 'mission-led' approach to delivery, based on economist Maria Mazzucato's work on the 'mission economy' (see panel).

These missions will take a whole government approach, to ensure departments are communicating across silos on issues of common interest and emphasise long-term outcomes over short-term fixes. In his first press conference as prime minister, Keir Starmer announced that he'll establish 'mission delivery boards', which he will chair.

The key mission for UK plc is to become a 'green economy superpower' - an innovator and exporter of the green technology of tomorrow, in support of developing skilled jobs, delivering regional growth, addressing climate, energy and food security and other environmental concerns, such as water and air quality and the associated health benefits. As ADBA members will recognise, the goals resonate loudly with what our industry can deliver.

In the King's Speech Labour began to deliver on its top line manifesto pledges for green growth, under its overarching **Green Prosperity Plan**. The speech included an **Energy Independence Bill**. This piece of legislation will put into motion the creation of **Great British Energy** - a new publicly-owned company which will invest in renewable energy projects across the UK.

The associated **National Wealth Fund Bill** creates a national wealth fund, supported by £7.3 billion in state funding, to attract private investment for key infrastructure projects at a ratio of 3:1, particularly in net zero technology. £1bn is reportedly targeted at accelerating the deployment of carbon capture and £500M to support the manufacturing of green hydrogen.

With the **Planning and Infrastructure Bill**, the government seeks to make it easier to build essential infrastructure. In the meantime, work is underway to develop a new 10-year **Infrastructure Plan**. Two key mechanisms within Labour's **Industrial Strategy** will steer the development and delivery of the Infrastructure Plan, a beefed-up statutory body, the **Industrial Strategy Council (ISC)** and newly minted executive agency **National Infrastructure and Service Transformation Authority (NISTA)** (see panel).

Biogas – critical net zero infrastructure

As soon as the election results were in, ADBA congratulated the Labour Party on its General Election victory and welcomed the new government's emphasis on tackling climate change through rapid growth of renewables.

It is encouraging that the government's Green Prosperity Plan includes key goals that can be met best through green gas expansion: accelerating net zero; increasing resilience, climate, energy and food security; protecting nature; clean water; and supporting British farmers.

"The key now is delivery. We can build hundreds of new green gas plants by the time of the next election," said Chris Huhne, chair of ADBA. "Green gas can and should grow faster than wind, and second only to solar according to International Energy Agency projections.

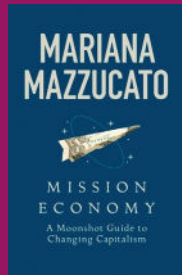
MISSION ECONOMY



Labour's mission-led government is inspired by Mariana Mazzucato, Professor in the Economics of Innovation and Public Value at University College London, where she is Founding Director of the UCL Institute for Innovation & Public Purpose (IIPP).

She defined what a mission-led government would look like in her book, *Mission Economy; A moonshot guide to changing capitalism*.

Taking her inspiration from the Apollo 'moonshot' programmes which successfully coordinated public and private sectors on a massive scale, Mariana Mazzucato calls for the same level of boldness and experimentation to be applied to the biggest problems of our time.



To solve the massive crises facing us, we must be innovative – we must use collaborative, mission-oriented thinking while also bringing a stakeholder view of public private partnerships which means not only taking risks together but also sharing the rewards.

“Energy from home-grown green gas will overtake energy from nuclear early in the next decade on current trends. Because green gas is created by using waste streams from farming, food and industry, it is a British resource that can protect us against Putin hikes in gas prices and curb our energy imports.”

Of real cause for concern, however, is that the issues of **waste management and recycling** were elusive in the manifesto and remain so in the first months of government. The only reference was that “Labour is committed to reducing waste by moving to a circular economy.” Defra, however, has been tasked with developing a net zero waste roadmap (see page 9).

Farming received similar broadbrush treatment; “Labour recognises that food security is national security. That is why we will champion British farming whilst protecting the environment.” The NFU meanwhile has warned that plans to make farming ‘net zero’ by 2040 are at risk. The Soil Association went further, warning that UK agriculture would not be able to reach net zero greenhouse gas emissions “without radical changes to how we produce and eat food”.

These areas must be addressed. Biogas holds the key to sector decarbonisation. ADBA has been stressing its 10 key campaigning goals on behalf of the green gas sector of renewables and says that they could all be easily implemented in the first year of a new government by using secondary legislation (see page 14).

Biogas is critical net zero infrastructure that can deliver today, not in 5, 10 or 20 years like other solutions such as hydrogen and nuclear. Biogas is a complementary technology to wind and solar, enabling Labour's 100% renewable power by 2030, by providing load balance at times of intermittent supply. Labour has said it will maintain a strategic reserve of gas power stations to guarantee security of supply and these can run as well on biomethane as on fossil gas.

Biogas is also compatible with a hydrogen future, aligned in their roles in decarbonisation, infrastructure and sustainable energy futures. The government's commitment to maintain gas power stations – to serve as

INFRASTRUCTURE PLANNING

To set the green infrastructure priorities of the UK and ensure the smooth delivery of projects, the government is to streamline project planning and oversight.

The existing **Industrial Strategy Council (ISC)** will be placed on a statutory footing like the Climate Change Committee (CCC) and Office for Budget Responsibility (OBR) to strengthen its role. It is envisioned that by providing credible independent analyses of the UK's economic challenges, the ISC will help to ground and shape policymaking and industrial policy beyond the government that founded it. It will report to Parliament as well as government. The Council will be a full-time expert body, supported by an advisory board of leading figures in business, the trade union movement and academia, drawn from across sectors and across the regions and nations. It will work with devolved governments and institutions to ensure a whole UK approach that prioritises regional and local growth.

The **National Infrastructure and Service Transformation Authority (NISTA)** meanwhile will be result from a merger of the National Infrastructure Commission (NIC) and Infrastructure and Projects Authority (IPA), to create a “new, powerful” body to “better support the delivery of major capital projects”. By bringing together expertise from across the infrastructure and procurement sectors, Nista aims to develop commercial excellence in the development of green infrastructure. Its formation is an outcome from Labour's Major Capital Projects Review, which was supported by experts from National Grid, Mace, Jacobs, Skanska and more. Nista will be overseen by a board that includes external experts and it will be jointly accountable to the Treasury and the Cabinet Office.

mass balance for electrification – and invest in hydrogen, and the **national gas grid's** purchase by Macquarie hopefully indicates that proposals to decommission the grid have been spiked.

From the Climate Change Committee to the Biomass Strategy, it is recognised that there is no net zero without biogas. The UK Industry has the potential to generate at least 7.1 billion m3 of biomethane a year, enough to reduce the UK's carbon emissions by 6% and deliver 30% of the government's commitment to the Global Methane Pledge, to reduce methane emissions by 30% against 1990 levels by 2030. All the while decarbonising the hard to decarbonise sectors of farming, food production, waste management, transport, and heavy industry through green heat and transport fuel production.

Mission biogas

A key driver of the government's clean energy mission is to create the technology and jobs of the future, to export around the world and build prosperity. Biogas is in the vanguard of the most important advances and exploration in green technology and production pathways, for green shipping fuel, sustainable aviation fuel, green methanol/ethanol and green hydrogen to name a few.

Biogas and biomethane production are also in the vanguard when it comes to the emerging markets for carbon removals and carbon farming. Carbon removals refer to innovative approaches to capturing CO₂, directly from the atmosphere and from biogenic emission sources, before storing it in reservoirs

Continued>>

MISSION BIOGAS: KEY CABINET MINISTERS

Biogas spans multiple government ministries, making cross-departmental collaboration essential to ensure its effective development and implementation.



Angela Rayner

Deputy Prime Minister
and Secretary of State for
Housing, Communities and
Local Government



Ed Miliband

Secretary of State for
Energy Security and Net
Zero



Jonathan Reynolds

Secretary of State for
Business and Trade,
President of the Board of
Trade



Louise Haigh

Secretary of State for
Transport



Steve Reed OBE

Secretary of State for
Environment, Food and
Rural Affairs

such as geological formations, forests, soil or products for the long term, whereas carbon farming refers to climate-friendly practices implemented by farmers and foresters to enhance carbon sequestration and storage in forests and soils, as well as reduce greenhouse gas emissions from soils.

Furthermore, during India's Presidency of the G20 the country launched the Global Biofuels Alliance, to promote the development and adoption of sustainable biofuels and set relevant standards and certification. The World Biogas Association, which co-hosts the World Biogas Expo and Summit with ADBA, is one of 12 founding organisations. Given the UK government's stated interest in transport decarbonisation and SAF it would do well to consider joining.

Meanwhile, under its Presidency of the G20, Brazil has launched the Global Bioeconomy Initiative, based on three topics: science, technology and innovation; sustainable use of biodiversity; and the role of bio economy in

promoting sustainable development. The agreed principles include promoting sustainable consumption and production patterns, the efficient and circular use of biological resources, and trade for bioeconomy products and services.

ADBA members co-authored with WBA colleagues policy papers on solid waste management that have been published by the T20, the think tank of the G20. It will be sure to feature on the agendas when next year Brazil hosts the BRICS+ summit and COP30.

As the world shifts towards cleaner energy solutions, the UK government must seize this momentum and invest in biogas infrastructure, to take a leadership role in developing the policies and technologies that can deliver the green fuels, natural fertilisers and other bioresources of the future. This will not only align the country with global sustainability goals but also boost economic resilience, create jobs and help achieve its own net-zero targets. Now is the time for the government to act and prioritise biogas in its green investment strategy.



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MISSION BIOGAS; ADBA'S 10-POINT BIOGAS ROAD MAP

#1 Build 1,000 new biogas plants to shield consumers from sky-high prices

As we saw following the Russian invasion of Ukraine almost two years ago now, the UK is at the mercy of fossil gas prices. In early 2022, gas prices soared to a peak of 642p/therm, sending us into a spiralling energy crisis and a scramble to reduce our reliance on Russian gas imports. Insisting that green gas makes up part of gas supply and backing new plants with green gas contracts for difference, would protect consumers and increase energy security. We can build 1,000 new biogas plants by 2030 to protect us all from sky-high energy prices.

#2 Keep supermarket shelves stocked by using UK-made biofertiliser

Synthetic fertiliser is made through the energy-intensive Haber-Bosch process which requires large amounts of fossil fuels. Alongside the rise of oil and gas prices, synthetic fertiliser prices have risen, too. Moreover, synthetic fertiliser is a significant contributor to soil health degradation and the disruption of the vital Nitrogen and Phosphorus cycles. Digestate, a nutrient-rich biofertiliser, is one of several valuable AD byproducts. By substituting synthetic fertiliser with biofertiliser and increasing market support for its use, we can close the loop of the circular economy, protect farmers against volatile prices of synthetic fertiliser, and increase UK food security by keeping food shelves stocked.

#3 Clean up our rivers and beaches by treating farm waste with AD

AD can help tackle water pollution and keep our waterways clean. Agricultural waste is often improperly disposed of and managed. Run-off of nutrients, pathogens, and contaminants from animal farms leads to dangerous pollution which causes eutrophication, dead zones, and disruptions to biodiversity. On-farm AD provides a closed-loop system for properly storing and recycling animal waste. On-farm AD is a win-win-win that protects our waterways, offers solutions for livestock waste management, and provides farmers with essential green gas energy to keep their farms running.

#4 Create 18,000 new skilled jobs across the UK Number four addresses jobs and the growth of the sector. The IEA published its Annual Energy Outlook for 2023, forecasting that the biogas sector will grow anywhere between 8 and 22% by 2030. At the minimum, that would forecast 500 new plants creating home-grown green gas. It is already apparent how quickly AD can be scaled up and new plants can be brought online. At ADBA, we are calling for the development of at least 1000 new plants in that time, and with it, creating 18,000 new skilled jobs across the country.

#5 Stop the Emissions Trading Scheme penalising green gas

Notorious methane is a fast-acting greenhouse gas that heats the atmosphere at considerably higher rates than CO₂. However, the UK Emissions Trading Scheme (UK-ETS) penalises biomethane as if it were fossil gas, meaning that no greenhouse gas mitigation benefits are being offered to biogas plants, which abate methane emissions. Therefore, we are calling for allowances to stop penalising green gas.

#6 Pledge to establish a plan to decarbonise farming and use farm wastes

Farming is too important to ignore in our effort to decarbonise. Using the energy stored in farm wastes is key. Agriculture is responsible for considerable amounts of the UK's overall greenhouse gas emissions, at 11% in 2020. Even more dramatically, agriculture contributes to 69% of the UK's nitrous oxide emissions and 48% of its methane emissions, two powerful greenhouse gases with global warming potentials significantly higher than CO₂. The CCC has already acknowledged that AD is a necessary part of agricultural decarbonisation. Now is the time to act.

#7 Ease local planning with guidance to every local authority

Local planning must be eased through guidance to every local authority. Many local authorities have never approved a green gas plant before and are unfamiliar with the process. Thus, we are calling upon the government for its support in acknowledging AD as a vital part of reaching its net zero goals. To do that, it must issue standardized guidance to councils on new AD plants, treating them as the critical infrastructure they are.

#8 Ease permitting and grid connections Permitting delays are amongst greatest challenges for the industry. The process at its slowest can take several years. To change that, the Environment Agency and other permitting bodies need adequate funding and staffing. Our eighth point calls for a streamlined permitting process through increased funding to slash these permitting delays from years to months and increase application approvals overall. Connections to the gas and electricity grids must be made as easy as possible to develop the green gas industry fully. This is essential for new plants. ADBA stands four square with other renewable organisations in pressing the government to boost investment in our grid infrastructure to ensure that the most value can be extracted from green gas.

#9 Ban food waste going to landfills and mandate weekly food waste collections

The UK produces millions of tonnes of food waste each year. Too much still goes to landfill. Defra's recently backed separate food waste collections in the coming years, but this process has been pushed back continuously. After a series of broken promises leaving local authorities expectant and disappointed, we need to be staunch in our position that this roll-out sees no further delays. There should be absolutely no food waste going to landfills, and this valuable feedstock should be taken advantage of by sending it to be recycled through AD to produce valuable green gas.

#10 Curb climate change from powerful methane Methane is a powerful greenhouse gas with a shorter atmospheric lifespan than CO₂ but a much higher global warming potential. The temperature response of methane is incredibly dramatic over a short period of time, compared to carbon dioxide which warms slower but lingers longer. Many of the previous ten steps demonstrate how AD can mitigate methane emissions by preventing the gas from being emitted from rotting organic wastes. By scaling up green gas, we can ensure that the UK meets its Global Methane Pledge goals and help curb climate change by stopping methane in its tracks.



GET READY FOR THE AI BOOST

From fintech to farming, healthcare to energy, all corners of the economy are celebrating the boost to productivity secured through AI-driven efficiencies. Biogas production will be a big winner too, writes **Angela Bywater**.

Artificial intelligence (AI) and machine learning (ML) are technologies that have revolutionised how we interact with data and processes in various industries. In essence, they are tools or systems used to automate, enhance, and optimise processes across industries. AI refers to the simulation of human intelligence in machines, enabling them to perform tasks like decision-making, speech recognition and problem-solving. Siri, Alexa and ChatGPT are all examples of generative AI.

ML is a subset of AI. ML involves algorithms that allow systems to learn from data and improve their performance over time without human intervention or programming. Combined, these technologies are transforming all aspects of the economy from fintech to farming, healthcare to energy by improving efficiency, accuracy and adaptability.

Integration into Supervisory Control and Data Acquisition (SCADA) systems for anaerobic digesters is an obvious use for AI and ML. Traditionally, SCADA systems are used to monitor and control the operational parameters of anaerobic digesters, such as temperature, pressure and biogas output. The integration of AI and ML could greatly enhance the capabilities of these systems in a number of ways.

1. Predictive Maintenance AI and ML could be used to analyse data from sensors within the digester to predict when maintenance is required, reducing the risk of unexpected failures or breakdowns. By identifying patterns that indicate wear or degradation in system components, these technologies can help operators schedule maintenance proactively, avoiding costly and unexpected downtime. Conversely, AI can identify anomalies in the data that might indicate sensor malfunctions or unexpected system behaviours, alerting operators before minor issues escalate into larger problems.

2. Optimisation of Biogas Production Algorithms could be used to continuously analyse real-time data from the SCADA system to optimise digester performance. For instance, ML models are programmed to learn from historical data and adjust operational parameters (e.g., feedstock composition, retention time, temperature) to maximise biogas production while minimising waste.

3. Feedstock Management AI could help in the selection and management of feedstocks by predicting the most efficient combinations of organic waste materials for biogas production. Furthermore, these algorithms can factor in other considerations such as feedstock variability, environmental conditions, seasonal availability, cost and nutrient composition to suggest the best feedstock strategies, sensitive to local circumstances, including digestate offtake. The system could adjust control and inventory management strategies to ensure optimal performance without human intervention.

4. Process Stability and Control If the correct data is available, AI-driven SCADA systems could monitor the biological processes inside the digester and provide early warnings about potential process instability, such as acidification or accumulation of inhibitors. ML models can also help to understand and relate the complex biological interactions between microorganisms to performance and improve system predictability, allowing for stable and efficient biogas production.

5. Energy Management AI and ML models could be used to forecast energy demand and biogas production to optimise the balance between energy generation and consumption. By predicting future energy prices and demand, AI can help adjust operations to maximise profitability and/or to align with grid requirements.

Continued>>

To be effective, these models require large amounts of robust and relevant data. Even where a SCADA system has collected large amounts of data, it might not cover all bases – there may not be information available to explain some data anomalies if the cause has not been previously experienced or modelled, for example, where a pump failed and needed repair or where the feedstock dregs of a silage clamp were used.

The complexities of AD's mixed microbial communities and their interaction with their environment – the engineering/biology interface – should not be underestimated. Although significant progress has been made in understanding these systems in recent years, there are still gaps in our knowledge. This includes the basic science, thorough life-cycle analysis, and how to optimise the technology for nutrient recycling, pollution control and renewable energy generation. AI and ML can help improve our understanding across the process.

Revolutionary Use of AI in Anaerobic Digesters

The "Artificial Intelligence Enabling Future Optimal Flexible Biogas Production for Net Zero (AI4AD)" project, funded by UK Research & Innovation AI for Net-Zero, aims to enhance the flexibility and profitability of AD systems for biogas production. The project's overarching goal is to accelerate the AD industry's contribution to the UK's Net Zero ambitions by leveraging AI to create a digitalised, data-driven system for biogas production.



Led by Dr Michael Short from the University of Surrey, this multi-disciplinary team consists of industry and academic partners, with expertise in AI, ML, life-cycle and techno-economic analysis, as well as biologists looking to understand the composition and function of these mixed microbial communities and the behaviour of AD systems under conditions which cannot be replicated at full-scale, such as temperature or mixing fluctuations, under- and over-feeding.

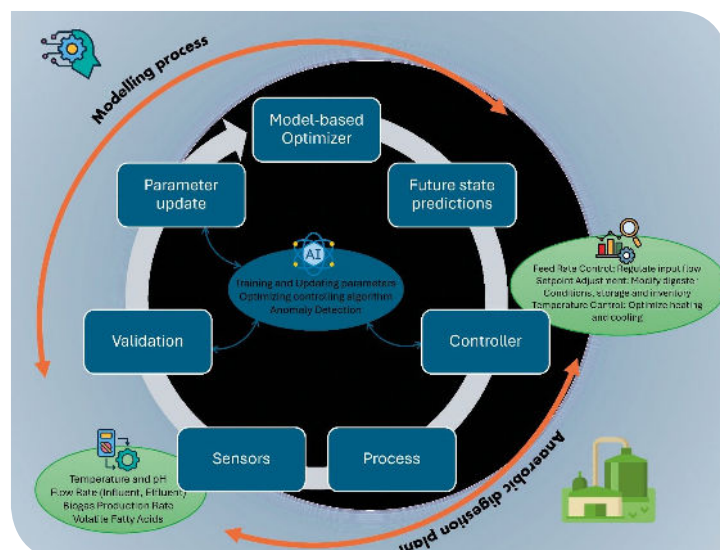
The use of AI and ML in understanding the biological systems within anaerobic digesters is groundbreaking because of the complexity of these systems. Anaerobic digestion relies on a diverse community of microorganisms to break down organic matter and produce biogas. The microbial populations within the digester are influenced by a wide range of factors, including temperature, pH, and feedstock composition. Traditionally, AD operators have used their hard-won experience to optimise these variables as far as possible, but these models can analyse and simultaneously optimise a far greater range of variables for optimal biogas production.

By employing AI and ML, researchers can model the intricate relationships between operating conditions and microbial behaviour in real time. This enables the prediction of how microbial populations will respond to changes in feedstock or environmental conditions, allowing for more precise control over the biogas production process. In this way AI-driven insights can optimise digestion processes, enhance biogas yields and reduce downtime due to system instability.

Future Improvements in AI for Mixed Microbial Systems

One area of potential improvement is the development of more advanced 'digital twins' that incorporate real-time genomic and metabolic data from microbial populations. A digital twin is a digital replica of a physical object, person, system, or process, contextualised in a digital version of its environment. Digital twins can help many kinds of organisations simulate real situations and their outcomes, ultimately allowing them to make better decisions.

As technologies for metagenomic and metabolomic analysis become more affordable and accessible, it will be possible to create digital twins that not only monitor system performance but also provide detailed insights into the functional roles of specific microbial species within the digester.



This diagram illustrates the integration of AI-driven optimisation and control in AD plants, showing a continuous feedback loop that monitors key parameters (like temperature, flow rate, and biogas production) and adjusts operations in real-time to enhance efficiency and stability.

Another area of future development is the incorporation of AI models that can learn and adapt over time. As more data is collected from operating AD plants, AI systems could use reinforcement learning techniques to continuously improve their performance, becoming more accurate at predicting that particular system's behaviour and identifying optimisation opportunities.

Finally, improvements in sensor technology can play a crucial role in advancing AI and ML for mixed microbial systems. More precise and reliable sensors could enable the collection of higher-quality data, allowing the models to make more informed decisions. These sensors could monitor not only traditional variables like temperature and pH but also the metabolic activity of specific microbial populations, providing a more comprehensive view of the system.

AI and ML in Optimising Anaerobic Digester Feedstock Supply Chains

Another key area where AI and ML can drive significant improvements in AD systems is feedstock supply chain optimisation. The cost and availability of high-quality waste feedstocks for AD are highly variable, depending on factors like seasonality and market prices. AI models can help operators forecast future feedstock availability and energy prices, enabling them to make more informed decisions about procurement.

By integrating these predictions with real-time data from the AD process, AI systems can optimise feedstock combinations to maximise biogas production while minimising costs. This could include switching to cheaper or more readily available feedstocks when high-quality materials are scarce, without sacrificing system performance. Moreover, AI-driven supply chain optimisation could help operators plan for future energy price fluctuations, allowing them to adjust their feedstock strategies to maintain profitability even as market conditions change.

Data collection and efficiency improvements enabled through AI methods can improve sustainability and allow real-time monitoring and potential control of these factors. Through incorporating not only economic indicators in the decision-making from these automated systems, we may be able to consider lifecycle assessment (LCA) indicators. AI-enabled optimisation techniques such as genetic algorithms are effective at multi-objective decision-making for these complex decisions.

AI4AD - A MULTI-DISCIPLINARY APPROACH

The AI4AD project is structured into several work packages (WPs), each examining a different facet of the AD process.

1. Whole-Site System Modelling for Real-Time Multi-Objective Optimisation and Negative Emissions Assessment - This work package focuses on the real-time optimisation of AD sites under uncertain conditions, with a multi-objective approach that balances economic, environmental, and operational goals. It also evaluates the life cycle costs (LCC) and greenhouse gas (GHG) savings, which are crucial for developing more sustainable and cost-effective biogas systems.

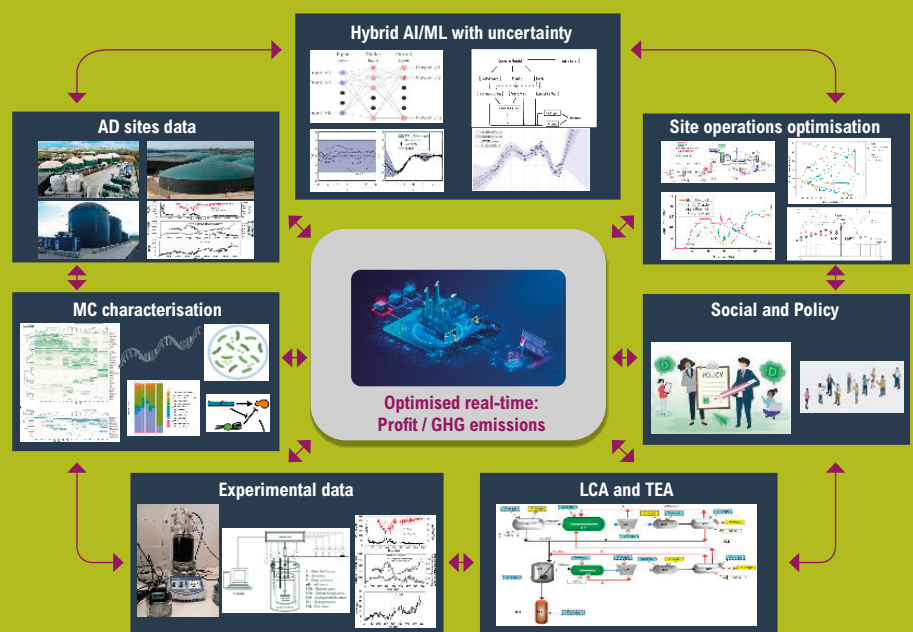
2. AI-Enabled Digital Twin of Anaerobic Biodigester - The second work package is dedicated to developing a hybrid machine learning-based digital twin for anaerobic biodigesters. A digital twin is a virtual representation of the physical system, allowing for real-time monitoring and predictive maintenance. This package also aims to optimise biodigester performance, improving biogas yields and system stability.

3. Experimental Programme and Microbiome Characterisation - This WP focuses on collecting and analysing industrial data from AD plants. This data is used to build comprehensive datasets on feedstock digestate and digestion processes. Additionally, it involves microbiome characterisation, a critical step in understanding how different microbial communities within the digester contribute to biogas production.

4. Integration, Validation, and Easy-to-Use Software Implementation

This package involves integrating models and data into an easy-to-use software platform, enabling real-time decision-making for AD operators. The software will simplify the complex process of managing an AD plant, allowing operators to make informed decisions on feedstock procurement and operational strategies.

5. Building a Community, Outreach, and Policy Dissemination - is focused on community outreach and policy advocacy. The goal is to foster a broader AI for Net-Zero community while ensuring the project's outcomes are accessible to policymakers, researchers, and industry stakeholders. This package is essential for ensuring the widespread adoption of the technologies developed during the project.



Digital Guides to Greater Efficiencies

While AI holds great promise for revolutionising the AD industry, several challenges arise when using AI models to understand perturbations within anaerobic digesters. One of the primary challenges is the inherent uncertainty in biological systems. The microbial communities within a digester are highly dynamic and can react unpredictably to changes in feedstock or operational conditions.

Building AI models that can accurately predict these responses is complex, as it requires vast amounts of relevant data and sophisticated algorithms to capture the non-linear interactions between variables.

Moreover, the slow dynamics of AD processes add another layer of complexity. Changes in feedstock composition or environmental conditions can take time to manifest in system outputs like biogas production. AI models must account for these delays to make accurate predictions, which can be challenging when real-time optimisation is required.

Finally, the risk-averse nature of AD operators poses a barrier to the widespread adoption of AI solutions. Many operators are hesitant to rely on AI models for decision-making or automated control, particularly when the consequences of errors could include costly system downtime or decreased biogas production.

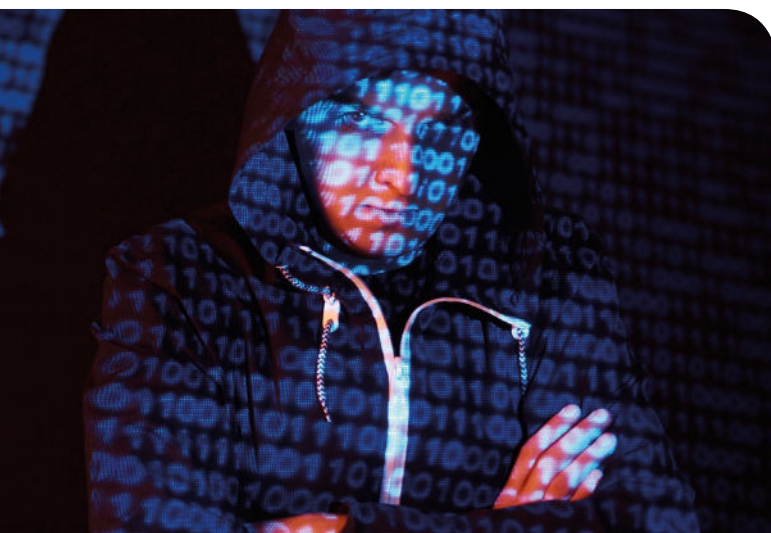
Making these models easier to understand and more transparent is crucial to enhancing trust and reliability.

The AI4AD project represents a significant step forward in the application of AI and ML to the AD industry. By developing advanced digital twins, real-time optimisation models, and supply chain management tools, the project aims to enhance the profitability and sustainability of biogas production in the UK. While challenges remain, particularly in modelling the complex and dynamic microbial communities within anaerobic digesters, the potential benefits of AI-driven optimisation are immense. As AI technologies continue to evolve, they will play an increasingly important role in driving the future of mixed microbial systems, paving the way for a more sustainable and resilient biogas industry.

The AI4AD team is led by Dr Michael Short and includes Prof Jhuma Sadhukhan, Prof Tao Chen, Dr Bing Guo, Dr Benaissa Dekhici, Dr Amin Zarei, Dr Duo Zhang, Rohit Murali, Meshkat Dolat, Mac-Anthony Nnorom and Ruosi Zhang (University of Surrey); Dr Yongqiang Liu, Tararag Pincam and Angela Bywater (University of Southampton); Dr Dongda Zhang, Dr Mengjia Zhu, and Oliver Pennington (University of Manchester) and Prof Jon McKechnie (University of Nottingham).

CYBER-ATTACKS AND SCADA SECURITY

Digital advances are accelerating AD efficiencies but also exposing plants to increased risk of cyber-attacks. Insurance underwriter **Karl Jones** outlines key considerations and defence measures.



Industrial control systems (ICS) with Supervisory Control and Data Acquisition (SCADA) were originally designed to operate in isolation, so cybersecurity was not a primary concern during their development.

Pressure to work faster, better, and cheaper has pushed ICS/SCADA systems to connect with enterprise systems for performance management and resource planning, allowing remote internet access for third-party suppliers.

While the efficiency gains are to be welcomed, this increasingly common interconnectivity also introduces new vulnerabilities for system breaches and cyber-attacks. And, it must be noted, the recent rise of generative AI makes it easier for even those without a high level of coding expertise to launch advanced and sophisticated attacks.

SCADA systems can control a number of important safety functions on Anaerobic Digestion (AD) infrastructure, including;

Flow rates, pressure, and temperature levels: Disruption to these controls could lead to dangerous operational failures, potentially causing equipment damage or safety hazards.

Monitoring toxic substances: SCADA systems track harmful chemicals like hydrogen sulfide and ammonia. A cyberattack compromising this monitoring could result in leaks or exposure to hazardous substances, endangering workers and the environment.

In short, a cyber breach could lead to severe safety risks.

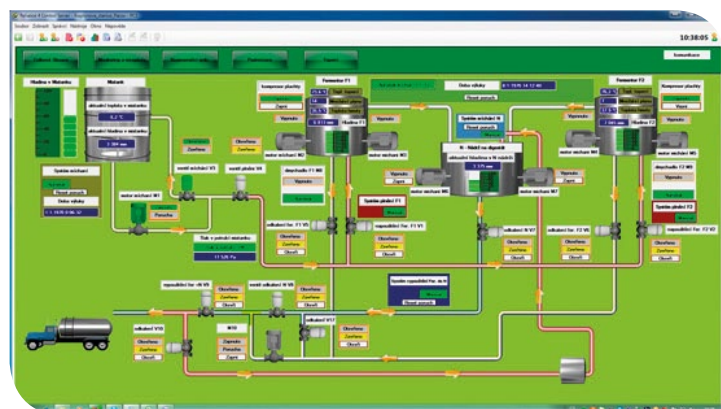
Breach Landscape

Whilst not aware of any AD-specific system breaches, there have been a number of relatively high-profile SCADA system breaches in recent years, which highlight the potential severity of the threat. Here are some of the more well-known attacks are:

- In May 2021, the Colonial Pipeline on the US East Coast suffered a ransomware attack. Vulnerabilities in Colonial Pipeline's IT systems were exploited, forcing the company to shut down the pipeline for several days, which led to fuel shortages and price spikes.
- In February 2021, a system breach at the Oldsmar Water Treatment Facility in Florida led to an attempt to poison the city's water supply through altering chemical levels. Fortunately, the activity was detected and stopped before any harm was done.

- In November 2023, The Municipal Water Authority of Aliquippa was the subject of a cyberattack by the pro-Iran hacking group Cyber Av3ngers, which was targeting critical infrastructure by breaching Israeli-made equipment amidst the Israeli-Hamas conflict. Although water quality or service was not impacted, the compromised equipment was replaced as a precautionary measure as part of a federal investigation.
- Another example involved a Triton attack, the name given to breaches specifically targeting safety instrumented systems, which are critical for preventing accidents in industrial environments. On this occasion, operator workstations and the devices in the safety systems of an industrial plant were compromised, and a Remote Access Trojan (RAT) installed. This gave the attackers easy access to the system at any time, which they could then use to make changes to safety settings and operating limits and cause or threaten to cause systematic failures, including the disabling of the plant safety systems. However, whilst moving through the systems, they triggered the emergency shutdown procedures. The subsequent investigation into the shutdown led to the discovery of the breach.

While these attacks largely 'failed', given the sophistication levels involved it is almost certain that the attackers will not have given up. They will have assessed what went wrong, fixed the problem and found another target, developing their skills still further. The reality is that there is an ever-growing list of attacks on ICS/SCADA systems, and that should concern anyone running operational technology systems within their organisation. In the last case, the motives were not known - it could have been to extort money from the plant owners, or to cause disruption and unrest for socio-political reasons if the attack was state-sponsored.



Greater interconnectivity introduces new vulnerabilities

The consequences of disabling safety systems can be catastrophic; the Buncefield explosion at an oil storage terminal in December 2005 was caused by the failure of two safety systems (and there's no evidence that the failure of two safety systems was anything other than an extraordinary coincidence). The resulting explosion caused damage estimated at over £894m, and disrupted organisations in the surrounding premises for many months.

Attacks on ICS/SCADA systems have targeted various products from multiple suppliers, and it would be naive to think AD plants are immune just because they have not (knowingly) been compromised yet. As AD plants become increasingly important for the UK's energy resilience, the risk of future attacks grows.

Although software and control system infrastructures are highly complex, the likelihood of vulnerability is higher than many people think. Given the ever-growing scale and sophistication of cyber-attacks, it is also highly likely that there have been unpublicised breaches involving SCADA systems, especially as there is no obligation on organisations that have suffered a data breach to notify the Information Commissioners Office if the breach does not expose individuals or customers (the primary focus of the four areas referenced in the ICO guidelines on reporting breaches).

While software and control system infrastructures are complex, they are more probably more vulnerable than many realise. The UK government in 2018 has found that organised crime gangs are only four or five years behind the ability of the advanced nation state cyber operations, and that gap has likely shrunk in the past six years.

With cyber-attacks becoming more advanced and sophisticated, it is likely that unreported breaches involving SCADA systems have occurred. In the UK, organisations are not required to notify the Information Commissioner's Office (ICO) about breaches that don't affect individuals or customers, as ICO guidelines focus on protecting personal data.

What can you do?

Given these threats, plant operators need to identify what kind of risks they face, and then work out the most cost-effective way to manage those risks. There is no easy answer because the technologies and processes vary so widely.

Organisations also need to recognise that there are increasing legislative changes coming into effect that require them to actively manage the cyber risks to their ICS/SCADA assets, such as the updated Control of Major Accident Hazards (COMAH) regulations. Operators of COMAH Establishments (lower and upper tier alike) are expected to be in the process of developing cyber-risk management systems and embarking upon cybersecurity risk assessments. These changes follow the guidance contained in IEC61511 and the Network and Information Systems Directive.

There is a range of guidance available to support businesses published by the UK National Cyber Security Centre, which outlines good practice in an eight-point guide:

- establish ongoing governance
- manage the business risk
- manage industrial control systems lifecycle
- improve awareness and skills
- select and implement security improvements
- manage vulnerabilities
- manage third-party risks
- establish response capabilities

Compliance does not necessarily equal security; there is a real danger of

creating a false sense of security from simply conducting a tick-box exercise without an informed assessment of the threats, risks and impacts that apply to each organisation and to each location owned and operated by it.

That assessment needs to use a proven approach to conducting ICS/SCADA health checks, which will provide an informed analysis of the threats. This should be performed by experts that have a background of working on ICS/SCADA systems so that they understand the issues and know the right questions to ask, to identify the risks that are unique to each operation.

The exposures here will not just be about the technology; they extend to the people and processes relating to ICS/SCADA. Risks and vulnerabilities can be found as much (if not more) in these factors as in the technology, and the appropriate security controls will need to be focussed on a combination of all the factors.

It is also vital to review the high-level security architecture and identify any changes that need to be made in the way the overall network is designed and built. Some simple measures can provide a significant reduction in risk. These include:

- use specialist protective monitoring tools and techniques to understand process data flows and monitor suspicious activity
- select and use industrial firewalls to defend against changes to settings
- engage specialists in security reviews of ICS/SCADA systems
- run additional awareness and training sessions for the operators and process engineers
- ensure that senior management are aware of the risks and the capability of attackers so that they have an accurate understanding and can re-evaluate their risk appetite and the resources required to manage risk effectively

Growing data transmission risks

A final factor is the increasing availability of Internet of Things (IoT) devices. IoT devices are pieces of hardware, such as sensors, actuators, gadgets, appliances or machines, that are programmed for certain applications and can transmit data over the internet or other networks. Their increasing use in plants brings a range of security risks that are still being evaluated.

Many of these devices do not have any real security capability, and they are often very easy to compromise, so you should evaluate the threats as well as the advantages that their integration can bring and source advice from experts who know how to build ICS/SCADA/IoT infrastructures that manage risks in a way that's aligned to your risk appetite, your business operations and can demonstrate value for money.

Ultimately, the risks are not going to go away. The need defend control systems from attackers will be ongoing and needs to be, and remain, at the top of the business agenda.

The sole purpose of this article is to provide guidance on the issues covered. This article is not intended to give legal advice, and, accordingly, it should not be relied upon. It should not be regarded as a comprehensive statement of the law and/or market practice in this area. We make no claims as to the completeness or accuracy of the information contained herein or in the links which were live at the date of publication. You should not act upon (or should refrain from acting upon) information in this publication without first seeking specific legal and/or specialist advice. Pen Underwriting Limited trading as OAMPS Hazardous Industries accepts no liability for any inaccuracy, omission or mistake in this publication, nor will we be responsible for any loss which may be suffered as a result of any person relying on the information contained herein.

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SPILL SKILLS

In the second of our quizzes focused on health and safety, we consider the ever-present hazard of chemical spills. ADBA Technical Support Manager **Flávio Ascenco** is your quizmaster

Spills involving chemicals can pose an obvious hazard to humans, causing severe burns, damage to eyesight and harm to the respiratory system. In some cases, the release of toxic or poisonous gases can result in severe illness and even death. Some chemicals and hazardous substances can also have a delayed carcinogenic effect.

Spills are an ever-present hazard on biogas plants where hazardous chemicals are used in the AD process and management of digestate, including:

- MPOX solution (used for dosing at the Primary and Secondary pumps, and at the Dewatering centrifuges)
- Sulphuric acid solution (used in the Chemical Odour control system and in some instances digestate management)
- Caustic soda solution (used in the Chemical Odour control system)
- Sodium hypochlorite solution (used in the Chemical Odour control system)
- Polyelectrolyte (used in dosing systems)
- Ferric chloride (used for dosing in the Lamellas, remains in sludge)
- Antifoaming agents, flocculants and coagulants (used in wastewater treatments)

Hazardous chemicals used on AD plants fall under the regulations known as COSHH – the Control of Substances Hazardous to Human Health. COSHH requires the operators of AD plants to conduct and document a risk assessment to identify and evaluate the potential risks posed by hazardous chemicals used in the process, and digestate management.

All chemicals acquired must have their MSDS (Material Safety Data Sheet) or SDS (Safety Data Sheet) to ensure the necessary information is available for developing accurate and relevant COSHH (Control of Substances Hazardous to Health) assessments. The regulations cover the correct **procedures for storing, transporting, handling, and disposing of chemicals**, to protect workers from hazardous substances by ensuring their safe management throughout the entire lifecycle, from storage to disposal.

But accidents do happen, and when they do, everyone should be prepared. COSHH mandates the development of **emergency procedures** to respond to hazardous spills. These should include:

- **Immediate evacuation** of the affected area if necessary
- **Use of spill kits**, employers must ensure that **spill kits** are available in areas where hazardous substances are used or stored. Spill kits should include absorbent materials, neutralisers, and tools to safely handle and dispose of chemical spills.
- **Shutting down processes** that could exacerbate the spill (e.g., turning off machinery or stopping chemical flow)
- **Ventilation** to prevent the build-up of hazardous fumes
- **Procedures for containing** the spill to avoid contamination of drains or soil.
- **Personal protective equipment**, workers involved in spill response must be provided with appropriate **PPE**. Depending on the chemical involved, this could include gloves, protective clothing, goggles, and respirators.
- **Disposal of Waste**, following a spill, COSHH requires that all **contaminated materials** (e.g., cleaning rags, absorbents) and the remaining hazardous substance are disposed of safely, following both **COSHH and environmental regulations**. This often involves using licensed hazardous waste contractors.
- **Reporting the Incident**, any significant spill or release of hazardous chemicals that leads to harm, potential harm, or a dangerous occurrence must be reported under **RIDDOR (Reporting of Injuries, Diseases, and Dangerous Occurrences Regulations)**. This includes incidents causing injury or illness due to chemical exposure and major spills that result in an uncontrolled release of hazardous substances. COSHH also requires documentation of the spill event, including details of the incident, response actions, and any follow-up measures (such as changes in procedures or additional training).



Some substances on site will be both potentially explosive, covered by DSEAR (see AD&B News edition 56), and hazardous to health, covered by COSHH, so will display the above symbols alongside 'Ex' symbol.

COSHH requires that workers be **trained** in spill response procedures. This includes knowing how to safely clean up a spill, use spill kits, handle chemicals, and when to escalate the situation to an emergency response team or external authorities.

A **hazardous chemical spill procedure** ensures that risks associated with spills are effectively managed, workers are trained in emergency responses, and the workplace remains safe during and after an incident.

Are you up to speed on the basics of spill prevention and management? Test yourself and colleagues here.

1. Immediately after a spill, what is most likely to cause structural damage to buildings?

- a) Corrosion
- b) Fumes
- c) Fire
- d) Noise

2. Which of the following are potential health effects caused by corrosive chemicals?

- a) damage to eyesight
- b) severe burns
- c) harm to the respiratory system
- d) All of these answers

3. After a spill, widespread contamination of drinking water becomes more likely when _____?

- a) people are informed about the spill
- b) the spill reaches the ground water
- c) emergency services are contacted
- d) clean up has concluded

4. The best way to deal with spills is to _____?

- a) prevent them happening in the first place
- b) avoid using liquids
- c) leave the room
- d) finish your task as quickly as possible

5. Every hazardous substance that is present in a workplace should have _____?

- a) an alarm fitted
- b) a metal container
- c) a safety data sheet
- d) an antidote

6. Anyone who handles chemicals as part of their job must _____?

- a) use mechanical aids at all times
- b) wear appropriate personal protective equipment
- c) work with a partner
- d) work a night shift

7. Which of the following should be included in a spill kit?

- a) personal protective equipment
- b) absorbents
- c) bags or bins for disposing of waste safely
- d) All of these answers

8. When a spill occurs, it's very important to first _____?

- a) find out who is responsible
- b) hose down the area
- c) inform everyone in the immediate vicinity
- d) remove all machinery

9. What should happen first when anyone is injured in a spill incident, or anyone has come into direct contact with a hazardous chemical?

- a) They should be removed from the area and taken to safety
- b) They should have a shower
- c) They should be reprimanded
- d) They should immediately remove all PPE

10. Which of the following are potential methods for controlling a spill?

- a) closing a valve
- b) opening windows
- c) picking up an overturned container
- d) All of these answers

Answers – page 27

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- Electrical Safety Awareness
- Electrical Panel Safety Control
- Feedstock Guidance
- Health & Safety Awareness
- Managing Summer Temperatures & Biological Health
- Plant Optimisation

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PREPARE TO SUCCEED



The ADCS is your guide to best practice and a boosted bottom line. ADBA's Technical Support Manager **Flávio Ascenco** introduces the revised certification scheme that offers a flightpath to success.

Over the past year, ADBA has led a comprehensive review of the anaerobic digestion certification scheme (ADCS) in collaboration with industry regulators and stakeholders. This update ensures the scheme aligns with the needs of our members and meets the growing demand from off-takers, government and devolved administrations for proof that best environmental and sustainable practices are being pursued.

The new scheme is designed to provide independent verification of AD operations, offering a trusted mark of quality that end users can rely on. To reflect the changing profile of the industry ADCS incorporates two new criteria, covering biogas upgrading and lifecycle assessment (see scheme criteria). As biogas becomes more integral to the UK's energy mix, the biogas sector needs to be seen to be operating professionally and sustainably. Regulations are tightening around operational health and safety, fugitive emissions and other sources of potentially negative environmental impacts to ensure the industry is held to the same standards as other energy sectors.

Operational health and safety on site are of course of paramount importance, for employees, contractors and members of the public. Robust OH&S management systems enhance overall business performance and result in reduced workplace accidents and illnesses and enhanced productivity and efficiency.

In recent years the AD industry has experienced particular scrutiny from the environmental regulators across the UK. Data indicates that the biowaste treatment sector, of which AD is an integral part, experiences a higher number of pollution incidents than any other regulated sector.

There have been several high-profile environmental incidents, some involving serious plant failures and resulting in environmental harm. This unfortunately damages the reputation of the entire industry, even though the incidents may be isolated.

The ADCS Scheme aims to help operators to understand the regulations that they need to comply with and achieve good practice across the board. It is the only scheme dedicated to anaerobic digestion and the specific operational requirements that need to be considered (see ADCS – support, guidance and certification).

Crude output data indicates there are currently several plants in the UK that are facing performance challenges. Tools like the ADCS play a vital role in helping to



ADCS – SUPPORT, GUIDANCE AND CERTIFICATION

When considering standards for AD operations there are two key recognised options that a site could be accredited to: the International Organisation of Standardisation (ISO) (45001, 9001 and 14001) and the Anaerobic Digestion Certification Scheme (ADCS).

ISO 45001, for Occupational Health and Safety (OH+S), 14001, for Environmental Management Systems (EMS), and 9001 for Quality management Systems (QMS) are international standards that prescribe a framework by which organisations can manage their OH+S, EMS, and management systems, respectively. These standards are designed to apply to any type of organisation, in any industry, in any country in the world and therefore simply set a framework of the factors that need to be considered for a company to effectively manage OH+S risk or have an EMS.

In contrast to this, the ADCS was developed in the UK by key stakeholders, including regulators, exclusively for the UK AD sector. It is the only standard specifically for the AD sector that sets out to promote and recognise operational excellence in the UK. It does this by assessing and supporting plants to achieve best practice, improved operational performance and compliance with OH+S and environmental regulations. Whereas an ISO audit will check that a process or framework is in place the ADCS will check specific procedures, documents and knowledge is present for that site to display best practice and compliance.

In the event of a non-compliance the auditor will support and guide the site to make the improvement and meet the criteria. As a result, the ADCS is not simply a standard that is either met or not met but rather a tool that sites can use to improve their performance and compliance and provide valuable external verification.

The two schemes can overlap. For example, some health and safety procedures and emergency response planning are considered to be met if ISO 45001 has been achieved and Environmental Management Systems (EMS) requirements are met if ISO 14001 has been achieved. Where ISO complements the ADCS it can help streamline the accreditation process and auditing requirements while still checking standards in other areas which aren't covered by ISOs.

address these issues. It has demonstrated its ability to enhance plant performance across multiple areas, including regulatory compliance and operational efficiency, supporting the growth and long-term resilience of the industry.

Flávio Ascenco, ADBA Technical Support Manager, says, "The enhancements to the ADCS Certification Scheme reflect our commitment and dedication to advancing industry standards. The independent verification process ensures that every certified AD plant meets the highest levels of safety and performance."

Climate and lifecycle data

As sustainability becomes an ever-greater priority for businesses and governments, off-takers are increasingly seeking low-carbon energy sources to reduce their carbon footprint. Certified sustainable biogas offers an attractive solution.

ADCS SCHEME CRITERIA

1. Site information and understanding

In order to run a plant effectively, an operator must have a clear understanding of the site layout, design and operation, and should have available plans and diagrams which are fundamental to ensuring this understanding.

2. Managing Health and Safety Risks

Safeguarding the health and safety of site workers, visitors and the public should be of the highest priority for any business. At AD plants, along with generic risks such as slips and falls, there are risks arising from the nature of the process, for example the production and storage of flammable gas. The operator must ensure that there are procedures in place to manage these risks.

3. Staff training and competence

There are many tasks to undertake in the running of an AD plant, from practical tasks such as carrying out maintenance or operation of equipment, to admin and managerial tasks. To ensure that the plant is run effectively and safely, and achieves legal compliance, staff must be suitably trained to carry out their specific role.

4. Process monitoring

Monitoring the biological health and stability of the digester, and the quality and quantity of outputs is essential to running an AD plant to its optimal potential, and therefore to give the best possible return on investment. Monitoring certain parameters can give an early indication of impending problems, poor efficiency or ineffective processes. Monitoring reduces the likelihood of environmental incidents, plant failure and contaminated digestate.

5. Maintenance of plant, kit and infrastructure

Ensuring that plant, kit and site infrastructure is well-maintained helps ensure the plant runs efficiently and safely.

6. Procuring Services (for example, servicing and maintenance)

Appointing suitable individuals and companies to carry out activities is a key part of delivering a successful AD project.

7. Managing environmental risks

AD provides many environmental benefits, including production of renewable fertiliser (digestate), the recovery of energy from waste and diversion of waste from landfill. However, like any construction or industrial type project, there are potential local environmental risks – an objective of the ADCS is to ensure that AD plants are designed, built and operated in such a way that safeguards the local environment from potential impacts.

8. Animal By-Products Regulations Compliance

Those AD plants which accept and treat animal by-products must ensure compliance with the ABPR in order to protect public and animal health.

9. Digestate Management

Managing the digestate produced at an AD plant is a minimum part of the operator's activities. Good quality digestate is an effective fertiliser and can reduce reliance on artificial fertiliser. It must be stored, handled and spread appropriately and in accordance with regulatory requirements.

10. Biomethane Process

This module is only for AD plants upgrading biomethane for injection to the gas grid. Understanding the function and safety requirements of the grid entry unit (GEU) and preventing ROV closure is essential for the safe, stable and profitable operation of a gas to grid facility.

11. Life cycle assessment

Life Cycle Assessment (LCA) is a methodology to estimate the environmental impacts and resources of a product or a process throughout its life cycle (from extraction of raw materials to product disposal at the end of use) and it is sometimes referred to as cradle-to-grave analysis. In this module evidence from regulated bodies is required to support the LCA.

Businesses looking to meet renewable energy quotas, comply with emissions regulations across Scope 1-3 emissions and meet their ESG (environmental, social and governance) commitments to shareholders on stock exchanges will increasingly favour biogas producers who can prove their operations are environmentally responsible.

This increased demand can lead to longer-term and more preferential purchase agreement contracts and greater market share.

Sustainable production practices also lead to operational efficiencies that lower costs and reduce the risk of regulatory fines or penalties related to environmental breaches, further protecting the bottom line.

The UK is legally bound to achieve net-zero emissions by 2050, and is a signatory to both the Paris Agreement, to keep global heating below 2C, ideally at 1.5C, and the Global Methane Pledge, to reduce methane emissions by 30% against 2020 levels by 2030. Action on methane emissions is recognised as one of the fastest and most cost-effective tools available to limit global temperature rise to 1.5°C.

Methane traps more heat in the atmosphere per molecule than carbon dioxide (CO₂), making it 86 times more harmful than CO₂ for 20 years after it is released. Due to methane's short atmospheric lifetime, acting to prevent

emissions can rapidly reduce atmospheric concentrations and in turn rates of warming across the next decade.

As biogas is promoted as a key renewable energy solution in respect of its ability to reduce methane emissions from organic wastes, all plants must be operated in a way to prevent fugitive emissions. Operators must also safeguard against other potential environmental impacts, including the risk of water contamination from poor digestate management and the effects of odour and noise pollution on surrounding communities.

Advances in monitoring technologies – thermal imaging, satellite sensing and real-time emissions tracking – have made it easier for regulators to detect and measure fugitive emissions. This has led to more stringent oversight of biogas plants to ensure they are maintaining best practices for efficiency, leak prevention and environmental protection.

AI and machine learning are set to significantly boost process efficiency (see page 15-17), while providing crucial performance data for lifecycle assessments and carbon intensity calculations. These metrics are becoming vital for revenue streams and adhering to new taxation areas, like the EU carbon border tax.

Continued>>

ADBA is dedicated to strengthening the biogas industry by promoting the importance of high-quality performance and adoption of best available technologies and processes. The ADCS is a voluntary certification scheme that sets best practices for AD plant operations. It focuses on key performance areas such as biogas yield, biogas quality, digestate quality, and compliance with environmental and safety regulations.

It offers a flight path to success, from first engagement through to accreditation. Joining the scheme provides a wide range of benefits to operators and other stakeholders in AD plants (such as owners and funders). With the help of impartial feedback from industry experts, the scheme offers fantastic value through undertaking one simple process. You can find more details by downloading the brochure here. www.adcertificationscheme.co.uk

ADCS ACCREDITED PLANTS

A clean and orderly AD facility is a visible indicator that OH&S systems are not only in place but are actively enforced, reducing risks, enhancing productivity and ensuring compliance with safety regulations.



**ANAEROBIC
DIGESTION
CERTIFICATION
SCHEME**





ANAEROBIC DIGESTION CERTIFICATION SCHEME

The only certification scheme in the UK that assesses the all-round safety, environmental and operational performance of anaerobic digestion plants.

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www.world-biogas-summit.com

ADBA is excited to announce that the dates have been set for the World Biogas Expo and Summit. The 15th annual trade show hosted by ADBA - latterly in collaboration with the **World Biogas Association (WBA)**, and the co-located World Biogas Summit – will take place at the NEC, Birmingham on 9-10 July.

The world's largest show dedicated to anaerobic digestion (AD) and biogas brings together industry leaders, policymakers, stakeholders, academics, and innovators from across the globe to explore the latest advances in biogas technology and its important role in combating climate change, improving air quality and reducing pollution of rivers and oceans.

The World Biogas Expo 2024 attracted over 3,000 registered delegates, 150 exhibitors and 60 expert speakers. ADBA Chair Chris Huhne led discussions across two days in the Engine Room theatre, where the focus was on plant optimisation, technical and process innovation. Key sessions focused on performance and particularly methane slippage and emissions.

Measure, Record, Verify (MRV) was the acronym of the two days and one all in the industry will have to understand and act on as we move forward. The biogas industry's rapid growth, fuelled by international action on methane emissions along the food chain, from farm to fork and food waste, has increased scrutiny on its green credentials. The Expo will showcase the advances and innovation in technology that are improving process efficiency, utilising AI and machine learning and pioneering approaches to recover

nutrients. The urgent need to decarbonise farming is topping the climate agenda, as countries seek to ensure food security, improve air quality and prevent further pollution of watercourses that are taking the world's great regulator, our oceans, to the brink of collapse.

With the Expo and Summit attracting an international audience, there is always great interest in the technology and innovation on show and last year many exhibitors reported getting quality leads in new and emerging markets. Scores of companies have already rebooked for 2025. One of the benefits of early engagement is greater exposure in the run-up to the event.

ADBA extends its gratitude to all attendees, speakers, presenters, exhibitors, and sponsors who contributed to making The World Biogas Expo and Summit 2024 a triumph and looks forward to making the 2025 an even greater success.

If you are interested in exhibiting, please contact maddie.hopper@adbioresources.org

If you are interested in sponsorship opportunities, please contact mark.galbraith@adbioresources.org



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AD PIONEER WINS OPPORTUNITY TO COLLABORATE WITH SHIMIZU CORPORATION

ADBA member **SEaB Energy** have entered into commercial discussions with Japanese construction giant **Shimizu** to develop compact AD solutions following a **UK-APAC Tech Growth Programme** reverse pitch.

In a typical reverse pitch set-up, a highly established corporation first asks tech start-ups to propose solutions to challenges they are facing. In a follow-up meeting the multinational assesses the results which have been created by start-ups. If they find something unique, then the company decides to partner with the start-up.

At the UK-APAC (UK Asia Pacific) event, representatives from Shimizu set out their plans to collaborate with UK tech companies to advance the corporation's 'Vision of 2030' (<https://t.ly/NaTeK>) sustainable business strategy. The Vision 2030 includes commitments to build strong and resilient infrastructure, provide built-environments that enhance health and well-being, use sustainable energy and promote of energy-saving, energy creation and ZEB (zero energy) facilities.

Ten companies – selected from among the UK's leading sustainability tech startups – then presented how its technology could support Shimizu's vision, before participating in a Q&A session. Shimizu selected SEaB Energy (<https://seabenergy.com>) as the winner because of its innovative, compact, easy-to-install anaerobic digestion systems housed in shipping containers. The systems are already being installed globally, both by SEaB Energy directly and through distribution and licensing agreements.



Sandra Sassow, SEaB Energy's CEO, said, "We're thrilled that Shimizu recognised the value creation opportunity of using sustainable energy and reducing CO₂ emissions via our waste-to-energy technology. Our various sized platforms and the significant reduction in emissions they deliver will help Shimizu win new construction orders and further promote the use of electricity derived from renewable energy sources. This aligns with the corporation's 'Vision of 2030' to realise a sustainable society."



Daisuke Kato, Head of the Acceleration Group at Shimizu's NOVARE facility, said, "Our focus on sustainability is strong, especially in Southeast Asia where we have a long history in construction. We were therefore delighted explore the solutions on offer in the UK-APAC Tech Growth Programme's reverse pitch."

"The event was incredibly insightful and we were impressed by the advanced technologies and expertise showcased by the UK companies in the field of net-zero buildings. They highlighted that UK sustainability efforts are a few steps ahead of Japan, which is valuable knowledge as we strive to close the gap in APAC. It was inspiring to see so many UK tech companies aligned with our goals for a sustainable future in Asia Pacific."

The UK-APAC Tech Growth Programme (<https://t.ly/3xR5u>) provides free and subsidised support to technology companies aspiring to enter one or more of 11 markets: South Korea, Japan, Taiwan, Singapore, Vietnam, Malaysia, the Philippines, Thailand, Indonesia, Australia and New Zealand. It is delivered on behalf of the government by international business development consultancy Intralink. Companies can apply to participate on the website below.

www.intralinkgroup.com/en-GB/About/TGP

AD AND BIOGAS INDUSTRY AWARDS 2025

Nominations for the **AD and Biogas Industry Awards 2025** are officially open. This prestigious event celebrates the standout achievements, innovations and leaders within the global biogas industry – providing winners with valuable international exposure. Whether you've made strides in technology, sustainability or leadership, now is your chance to be recognised among the best in the industry. Categories for 2025 are:

1. Health, Safety and Wellbeing
2. Women in Biogas
3. AD Hero of the Year
4. Best Anaerobic Digestion/Biogas Support
5. The Net Zero Circular Solutions
6. AD Education Campaign of the Year
7. Best Biogas Plant: Below 1Mwe
8. Best Biogas Plant: Above 1Mwe
9. Micro AD Initiative
10. AD Rising Star
11. AD Research and Innovation

Don't miss out on this incredible opportunity to showcase your success.

Nominations close on 31 December.

Submit your nominations via our simple online form at:

<https://adandbiogasindustryawards.awardsplatform.com>

For any questions or more information, contact

montana.hull@adbioresources.org We look forward to receiving your nominations and celebrating the best of biogas.

HEALTH AND SAFETY QUIZ ANSWERS

1. **C) Fire.** After a spill, structural damage to buildings, is most likely to occur from fire.
2. **D) All of these answers.** Severe burns can also result from contact with corrosive chemicals, as well as damage to eyesight and harm to the respiratory system.
3. **B) The spill reaches the ground water.** Once the spill reaches the ground water, there is also the potential for drinking water to become tainted for nearby communities.
4. **A) Prevent them happening in the first place.** The best way to deal with spills, obviously, is to prevent them happening in the first place.
5. **C) A safety data sheet.** This requires that everyone in the workplace has access to the safety data sheet for every hazardous substance that is present.
6. **B) Wear appropriate personal protective equipment.** Anyone who handles chemicals as part of their job must wear appropriate personal protective equipment (PPE).
7. **D) All of these answers.** Spill kits will include absorbents for soaking up spills, personal protective equipment to protect those cleaning up from exposure, bags for collecting chemicals, and bins for disposing of waste safely.
8. **C) Inform everyone in the immediate vicinity.** First, communicate. Let everyone in the immediate vicinity, and any managers or supervisors, know that a spill has occurred, and a hazard is present.
9. **A) Should be removed from the area and taken to safety.** Anyone who has been injured in the incident, or anyone who has come into direct contact with the hazardous chemical, should be removed from the area and taken to safety.
10. **D) All of these answers.** The next step is to control the spill, meaning, prevent it from getting any worse. This will depend on the situation – it might mean picking up an overturned container or closing a valve, opening windows or otherwise increasing ventilation to the area.



5-6 february 2025
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


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