The hidden power of small anaerobic digesters in the UK's green industrial revolution and opportunity for post-Brexit Britain

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In this week's speech to the Conservative Party (virtual) Conference, the Prime Minister acknowledged the savaging administered by 'Mother Nature' through the Covid-19 pandemic.

He promoted a vision for our future where, by harnessing 'basic natural phenomena' we could 'bounce back greener', with the government leading a 'green industrial revolution'.

I'm all in favour of the green industrial revolution. But, whilst the PM saw 'hundreds of thousands if not millions of jobs' being created in 'solar, hydrogen…carbon capture and storage', the most natural and greenest fuel of them all, biomethane, did not even get a mention.

Biomethane, as a Cinderella gas, is surely attributable to the most 'basic natural phenomena'. Produced from the humble organic wastes surrounding all human activity (food, animal, human wastes), it lacks the pizzazz of hydrogen's hero status, or the iconic position of wind turbines — unmissable as they stand tall on our landscapes, or even the glinting jewel-like reflections cast by the growing acreage of solar panels dotted across our countryside.

However according to Lord Deben, Chairman of the UK's Committee on Climate Change, biomethane's story is one that 'needs to be told much more widely.'

As has often been observed, 'where there's muck there's brass'. Even in 21st century Britain, or across the Channel in the world of our retreating neighbours in Europe or that inhabited by our new besties

over the pond, we are all ‘A-listers’ when it comes to waste production.

Speaking to the annual conference of Anaerobic Digesters and Bioresources Association (ADBA) three years ago Lord Deben highlighted that Anaerobic Digestion (AD) remained a “very important contributor in the fight to rid ourselves of climate change, improve our soils and eliminate large amounts of waste.” Similarly, in opening their annual conference again this year, on October 6th 2020, Lord Deben emphasised that in every scenario projected by the Climate Change Committee, a trebling of biomethane gas to the grid by 2050was forecast.

However, to achieve this, according to Dr David Kaner, CEO of Advanced Anaerobics Ltd, the biomethane industry needs to think beyond the current focus in the UK of building larger regional scale digesters fuelled by energy crops.

“A lot of the industry as currently configured is going in the wrong direction,” notes Dr Kaner, speaking to me on 6th October. “There are big opportunities in the management of wastes which will enable farmers to fuel their businesses whilst also addressing the sustainability concerns of many consumers in terms of the impact of meat, dairy and poultry production on the environment.”

He highlights the disparity between human and animal waste to draw out these opportunities. The UK produces 40m tonnes of human waste each year, 85% of which is treated by anaerobic digestion. Energy is extracted to power our water industry and eliminate pathogens and odours prior to its safe use as a fertiliser and soil improver.

“However, of the 90m tonnes of animal manures produced each year in the UK only 3% is treated. For every tonne of nitrogen going into the soil one third is nourishing our plants and crops with two thirds leaking into our watercourses and the environment. This is a national scandal and needs to be addressed urgently,” states Dr Kaner.

With these wastes being processed in the anaerobic digesters for an average of 30 days before being spread over the fields the process digestion will reduce pathogens and odours and will, subject to correct

spreading techniques, significantly improve the uptake of nitrates to the plants and reduce releases of nitrates and methane to the atmosphere along with nitrates to the water courses.

With feed-in tariffs a distant memory, electricity prices having doubled since 2005 and expected to increase by a further 20-25% by 2025, Dr Kaner believes there is a real opportunity to provide small-scale AD plants to farmers that are sustainable both in terms of finance and climate impact. He sees these as being capable of generating electricity at a cost of 10-15p/kWh including capital, operating and finance costs over 20 years. The goal would be to make this a real option for farmers with 200-300 head of cattle on dairy farms that keep herds indoors for at least part of the year, or for poultry and pig farmers where much of the waste is more easily collected in sheds.

With the planet's 1.5 billion cattle responsible for 18% of global greenhouse gas emissions and forecast to grow to 2.7 billion by 2050 through growth in our global population and meat consumption, smaller anaerobic digesters should provide a means to improved treatment of manures and slurries on the farm. "This will reduce pathogen transfers and improve animal health and should lead to a reduction in the use of antibiotics in farming," notes Dr Kaner. "The captured methane prevents the escape directly into the atmosphere of this greenhouse gas which happens when it is spread over land as a fertiliser. As methane is at least 34 times more damaging than carbon dioxide as a greenhouse gas, this aspect of biomethane energy production accounts for its 'carbon negative' impact resulting from the AD production process."

Dr Kaner who lives in Herefordshire noted that it should also tackle some of the run-offs which have so affected the countryside around Herefordshire recently.

According to Simon Evans of the Wye and Usk Foundation, these have been attributed to an increase in free range poultry farms being built along the River Wye. With chicken excrement rich in phosphates and other chemicals when it is spread around on the ground outside sheds and flushed into the local River Wye it has been attributed as the root cause behind the growth in deadly algal blooms featured along the River Wye over the past summer. Simon notes that these

have been getting worse and lasting longer in light of the 20 chicken sheds approved recently.

He fears for the future given these volumes and with a further 11 under consideration. “They used to appear in mid-river areas around Hereford,” he stated in a recent article in the Guardian (20th June 2020 *‘It’s like pea soup’: poultry farms turn Wye into wildlife death trap’*). “But now they are appearing far upstream in water that used to be clear all the time.”

As free range birds they are able to roam around outdoors and their phosphate rich droppings when flushed into the River Wye lead to phosphate blooms removing the oxygen and causing plants and fish to die.

As Dr Kaner notes, “For these farms smaller AD plants purchased at viable costs could provide most of their energy requirements whilst also leading to recycling of animal slurries with less leaching into our water courses and protected environments.”

Fresh thinking is needed to encourage the development of a sustainable AD industry based on large numbers of small plants along these lines, building a ‘clean farming’ future in the UK may be something we could actively promote as a post-Brexit benefit, explains Dr Kaner.

“We can produce more food with a reduced carbon impact to move towards our net zero goals which would deliver this triple win for agriculture especially at a time when a lot of young people are experimenting with veganism because of the impacts they see meat production having on the impending climate catastrophe. Whilst hydrogen gets the headlines it’s dangerous and potentially an explosive mix. It’s less dense and a lot more volume is needed for energy generation. Historically, most hydrogen has been generated from an energy mix at least dependent in part on fossil fuels.

“Whilst the biomethane production industry has been heading in the wrong direction so far, drawing on large scale plants fuelled by energy crops, after Brexit we have the freedom to control this for ourselves and can start to develop a smaller more flexible approach to support clean farming, our consumers and the environment.”