Green Industrial Revolution – Sound strategy or more sound bites?

By Associate Professor Beverley Nielsen, Centre for Brexit Studies and Institute for Design & Economic Acceleration, Birmingham City University

Last week the PM announced his ten-point plan for a 'green industrial revolution' accompanied by £12bn spend, which, the FT suggested, included only £3bn of new money ('*Green jobs must materialise if the UK is to take the lead in wind power'*, FT, 21st November 2020).

Bringing forward the ban on the sale of new petrol and diesel cars from 2035 to 2030, the plan also focussed on boosting hydrogen production through £500m investment, quadrupling offshore wind production, providing £525m for 'clean and micro nuclear' plants, £200m for two carbon capture clusters, making buildings cleaner by installing 600,000 heat pumps every year by 2028 and creating 250,000 new jobs in parts of the UK where the government 'wants to see levelling up', as Business Secretary, Alok Sharma told the BBC.

The government's plan did not highlight the green gas, biomethane, nor the opportunities provided through circular economy principles.

Lord Deben, Chairman of the UK's Committee on Climate Change, has stressed the importance of biomethane if the UK is to reach net zero targets, stating that Anaerobic Digestion (AD) remains a 'very important contributor in the fight to rid ourselves of climate change, improve our soils and eliminate large amounts of waste,' forecasting a trebling of biomethane gas to the grid by 2050.

It seems though, that biomethane remains a 'Cinderella solution', widely overlooked and misunderstood, whilst hydrogen is our gas equivalent of Prince Charming, promoted as a clean fuel releasing no direct carbon emissions or pollutants. It's true that as a gas it produces no harmful emissions, but as currently created, that's far from being the case.

With 70 million tonnes of hydrogen produced last year according to the International Energy Agency (IEA), hydrogen manufacture

accounts for 6% of global natural gas use. However, according to the IEA this production of H2 causes emissions equivalent to those of both Indonesia and the UK combined.

Why is this? It's because hydrogen has to be manufactured – existing naturally only in rare circumstances. Broadly, to create hydrogen there are three main methods employed. By far the biggest source of production, accounting for around 95% of current supplies, is 'grey' hydrogen made from fossil fuels through 'steam methane reformation'. It's an energy-intensive process emitting between 9-12 tonnes of CO2 for every tonne of hydrogen produced and finding a ready market in the production of fertilisers, currently consuming around 25% of all fossil fuel natural gas.

At the other end of the spectrum is 'green' or clean H2 made from electrolysis of water which, it's predicted, may be competitively priced by 2030. At present it's still prohibitively expensive, with a useful briefing in The Week suggesting it's priced around $270 per barrel compared to oil, priced at around $44 per barrel ('*The hydrogen revolution',* The Week, 21st November 2020). In between is "blue H2" where the carbon dioxide from the processing of H2 made from fossil fuels is accompanied by carbon capture and storage in underground caves, old mines or oil wells. Whilst the cost of electrolysis is falling fast, China has a huge lead in cost-effective electrolysis reportedly able to produce its equipment 80% cheaper than European or US alternatives.

With the UK government planning to publish its hydrogen strategy in early 2021, the Hydrogen Council indicates that hydrogen could meet 18% of the world's energy demands by 2050. IEA estimates biomethane could satisfy as much as 20% of global natural gas demand by 2050. In Denmark and Sweden biogas already accounts for 10% of total gas sales. It seems both options, managed properly, have useful contributions to make and should therefore be incentivised for long term investment and growth.

However, in July this year the European Environment Bureau (EEB) – a network of over 160 environmental organisations from across Europe — stated that the EU's hydrogen strategy was a 'gift to fossil fuel companies'. The strategy, intended to raise over €200 billion for the technology and infrastructure required to produce, store and

transport renewable hydrogen, includes estimates indicating that fossil-produced hydrogen will continue to account for 15% of Europe's energy mix by 2050. The EEB stated this risked making clean and fossil-free hydrogen uncompetitive and creating 'stranded assets'. Friends of the Earth Europe criticised the Commission as having 'fallen for the fossil fuel industry's hydrogen hype' leaving the 'door open to fossil hydrogen' by handing this lifeline to the fossil fuel industry.

In May this year, Britain's five gas network companies, including Cadent, National Grid, NGN, SGN, and Wales & West Utilities outlined their plans to invest almost a £1bn between 2021 and 2026, subject to government approval, in "blue hydrogen" carbon capture and storage projects, along with "green hydrogen" developed from renewable electricity. Nearly half of this spend targets new network infrastructure for industrial use of hydrogen, with over a third for carbon capture, utilisation and storage (CCUS) projects in the north-west of England and Aberdeenshire. However, as the EEB noted, to be commercially scalable and profitable, CCUS requires the continued use of fossil fuels – often at the expense of renewable solutions and cannot trap all carbon emissions with frequent leakages needing to be taken into account.

Some academics, like Research Fellow, Dr Richard Lowes of Exeter University, have urged greater caution as hydrogen contains a fraction of the calorific value of natural gas and with a smaller molecule poses a greater risk of leaks, (*'UK prepares to make 'big bet' on hydrogen power*', FT, 16th November 2020). Dr Lowes has argued that fossil fuel companies have been "overselling" hydrogen — particularly for heating as it allows them to continue using their natural gas infrastructure. Hydrogen, he's stated, is likely to have "niche" uses, potentially in decarbonising heavy industry or for storing renewable-produced electricity for longer periods than batteries. "I think we are getting totally carried away," said Dr Lowes. "The trouble is we just don't know at the moment because it's never been done and there are all of these uncertainties."

Meanwhile abundant supplies of the green gas biomethane, CH_4, are readily available arising from waste produced from the industrial and domestic preparation of foods, crop residues, household and commercial vegetable and meat wastes, sewage sludge and farm

animal manures. As much as 97% of animal wastes are unprocessed and one third of food waste is thrown away, with only about 10% of this recycled. The Anaerobic Digestion and Bioresources Association, ADBA, has stated that whilst this green gas is currently reducing UK greenhouse gas emissions by 1%, the industry could, with sufficient investment, generate 5.7 billion m3 per year of biomethane by 2030, enough to heat over 4.5 million homes, figures which, with further efficiencies, could rise to 7.1 billion m3 biomethane per year, heating 5.5 million homes providing 30,000 jobs across regional economies. However, *while a key incentive for the sector – the Renewable Heat Incentive (RHI) is due to close in March 2022, the Green Gas Support Scheme (GGSS) is only expected to open in Autumn 2022. With the government continuing to subsidise the fossil fuel industry the potential for investor interest in this green gas technology is being limited.*

The Overseas Development Institute in their report, *'Phase-out 2020 Monitoring Europe's fossil fuel subsidies',* noted that between 2014 and 2016, 997 fossil fuel subsidies, were provided through fiscal support, public finance, and investment by state-owned enterprises (SOEs) across the European Union with governments providing at least €49 billion per year to the transport sector as the biggest beneficiary.

Progress has been made in decarbonising the power sector, but future emissions reductions are expected to be slower unless the more challenging sectors are tackled, including transport, accounting for around 25% of UK emissions, with HGVs responsible for a large proportion of this. For large trucks and tractors, run, by and large, on diesel for heavy duty use, going electric is not a plausible solution in the short term. Battery electric vehicles (BEVs) are commercially available and well-suited for light, short-range transport sectors (cars, vans and trucks up to 8T) but there are few or no options for long-haul freight. Hydrogen fuel cell electric vehicles (FCEVs) are expected to provide a solution for HGVs in the long term but the technology readiness is low, and the timeframe is uncertain. Biomethane is currently the only proven, commercially available option for long haul vehicles.

According to CNG Services, operating in this field for 17 years, Well-to-Wheel (WTW) emissions savings of between 76-81% have been

achieved for HGVs drawing on pure biomethane and can be net-negative using biomethane from manure. Whilst additional capital investment is required for HGV operators, one and two year paybacks have been delivered through fuel savings.

Perhaps the conundrum resides in the larger gas companies needing to draw on our national gas grid, with the benefits of biomethane derived through local and regional networks (alongside the national grid) and through the associated development of local energy grids.

The Chair of Energy Capital West Midlands, Matthew Rhodes, has argued that without greatly enhanced devolution in England our chances of a 'just energy transition', tackling the 11% fuel poverty levels across the West Midlands, remain very low. With the devolution White Paper originally expected this year and now shelved at least until next year, and with the PM widely reported as stating last week to his Northern MPs that Scottish devolution was a 'disaster' having been 'Tony Blair's biggest mistake', this hope appears more distant than ever.

Energy Capital West Midlands stresses that the cleanest, cheapest energy will be achieved through more effective and sensitive local infrastructure planning as it depends to a much higher degree on effective integration of energy infrastructures with local geographies and infrastructures including transport, waste and telecoms systems. In the case of biomethane, a regional infrastructure is a requirement in enabling the metropolitan and rural areas, producing food and other organic wastes, to work together to join up their ability to source viable waste streams required to produce the biogas needed to meet their demands for energy use.

"Free markets will never deliver this, because the (local) infrastructures need to be there first", Rhodes explains. "Regional democratic accountability, leadership and responsibility are critical to manage the necessary trade-offs and ensure the views of local residents are represented in the process. A local energy system to encourage these outcomes (in the West Midlands) might be very different from one designed to support the priorities of either London or Scotland, for example."

With the challenges of Covid-19 and imminent Brexit uncertainty hanging over our economy, now is the time to harness locally-produced energy in tackling climate change and fuelling a sound green industrial revolution.