CCm Technologies: Introduction – February 2021

What is CCm Technologies?

CCm Technologies is an award-winning clean tech company which optimises resource use through **Carbon Capture and Utilisation (CCU) solutions**, including the **production of net zero carbon fertilisers** (see Sustainable Markets Initiative's RE:TV short video here for further information) which allow a wide range of businesses to **generate commercial value** from captured carbon and other agricultural and industrial waste streams while also **delivering improved sustainability**. It is commercially viable without any Government subsidies.

Oxford-based CCm Technologies was established in 2011. It is a member of HRH The Price of Wales's Sustainable Markets Initiative and a signatory of its recently launched Terra Carta, and also received the Solar Impulse Foundation Efficient Solutions Label.

CCm Technologies' full-scale demonstration plant

CCm's technology **uses captured carbon dioxide** from industrial power generation to stabilise a wide variety of materials (such as ammonia and phosphates) from **agricultural and industrial waste streams** and use these to create **new fertiliser products with significantly lower than usual carbon and resource footprints.** CCm's full-scale demonstration plant (pictured above) has been fully operational for over two years and producing significant quantities of ultra-low-carbon footprint fertiliser materials in solid and liquid formats.

The environmental benefits of CCm's technology

1. **Utilisation of waste streams – promoting a circular economy**

CCm's systems produce high-value, high-performance materials from low or negative value inputs, particularly from the water, food and agriculture sectors. The waste component of CCm's fertiliser is up to 90%, including components which could otherwise have ended up in landfill or discharged into water courses. The utilisation of existing resources reduces demand for finite elements and reliance on the highly energy-intensive processes usually involved in fertiliser production.

2. **Reduction of carbon emissions – contributing to the UK's net zero target**

Current agricultural processes produce around 10% of all UK greenhouse gases. By targeting the massive carbon footprints associated with conventional fertiliser production, which it can cut by more than 90%, CCm's technology can contribute meaningfully to achieving net zero. Carbon savings result from: direct capture and utilisation of waste CO_2, avoidance of primary carbon use, and carbon storage in soil.

The deployment of 50 standard CCm units in the UK could consequently result in **emissions avoidance equivalent to removing around 375,000 cars from the road each year**.

3. Ensuring high yields, improved soil fertility and low costs – facilitating farmers' net zero transition

CCm's products have been demonstrated to equal or outperform conventional fertilisers in terms of yield ad protein quality, with around 10% less nitrogen and phosphate applied. They also deliver additional environmental benefits including enhanced water and nutrient retention contributing to lower run-off and reduced water pollution, as well as increased carbon retention in soil.

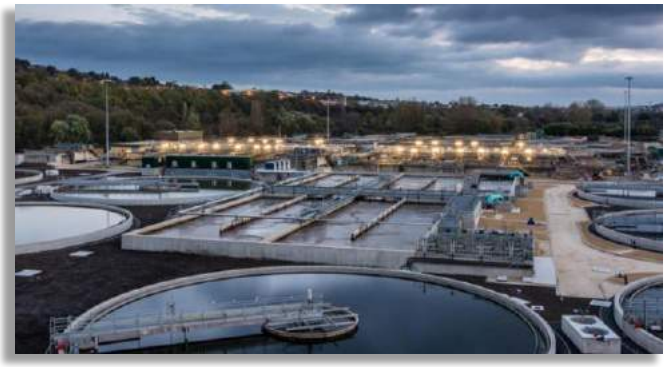
CCm's technologies can be **deployed immediately** and via the delivery mechanisms that currently supply UK agriculture. By drawing on end-of-use materials as inputs and involving a low-energy manufacturing process, the **sale price of CCm's materials is directly competitive** with existing products and is **financially viable without reliance on government subsidies.**

Case study 1: Severn Trent Water – exploring sustainable ways to recycle wastewater

In February 2020, CCm Technologies in partnership with Severn Trent Water was awarded approximately £1 million funding from the Department for Business, Energy and Industrial Strategy and the Carbon Trust to explore new sustainable ways to recycle wastewater and convert it into a commercial product. The project focusses on a new process, developed by CCm, which uses captured carbon dioxide to stabilise nitrogen, phosphate and organic chemicals held within waste streams at Severn Trent, turning them into sustainable plant nutrients and significantly reducing greenhouse gas emissions on site.

Case study 2: Yorkshire Water – recovery of Carbon, Ammonia & Phosphorus

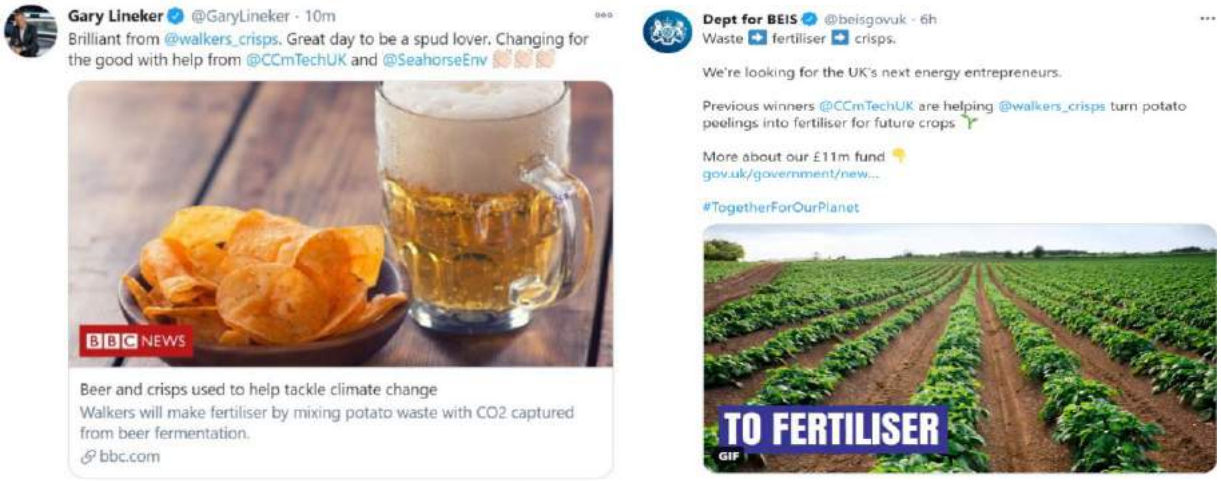
In July 2020 Yorkshire Water announced a partnership with CCm Technologies to implement CCm's unique integrated ammonia and phosphorus recovery process. Yorkshire Water will recover phosphate material from the wastewater treatment cycle by implementing the technology. This will substantially reduce capital investment and maintenance costs, whilst efficiently recycling nutrients as "Climate Positive" fertilisers so helping Yorkshire Water achieve its ambitious sustainability and Circular Economy targets through enhanced soil health.



Case study 3: PepsiCo partnership – reducing the carbon footprint of Walkers Crisps by 70%

In December 2020, PepsiCo and CCm announced that CCm's technology will be used to manufacture low-carbon, nutrient-rich fertilisers using potato peel waste from the crisp production supply chain, which will go directly back into the fields growing potatoes for Walkers Crisps.

By increasing the recovered resource input, use of the fertilisers is expected to reduce Walkers' carbon emissions from growing



How does net zero carbon fertiliser technology contribute to achievement of UK Government priorities?

Net zero carbon fertilisers, such as CCm's products, have the potential to support the achievement of key UK climate and environmental priorities, notably:

1. **Achieving net zero carbon by 2050**

The UK Government's commitment to reach net zero carbon emissions by 2050 will require action to decarbonise across the economy. Some sectors have already made significant progress, for example the UK power sector has contributed around half of the UK's overall emissions reduction since 1990 due to a reduction in coal-fired generation and an increase in renewables. However, other sectors have struggled to make such rapid progress towards decarbonisation. Notably, agriculture accounts for around 10% of UK greenhouse gas emissions and these emissions have not fallen significantly over recent years. Likewise, the water sector remains one of the UK's most energy-intensive sectors. In providing an innovative and cost-effective route for these sectors to cut their carbon footprint, net zero carbon fertiliser production, such as CCm's technology, could play a major role in the progress of difficult-to-decarbonise sectors towards Net Zero.

2. **Enabling farmers to protect public goods**

The Environmental Land Management (ELM) scheme, based on a 'public money for public goods' strategy, will underpin the UK's new agricultural strategy and support the achievement of 25 Year Environment Plan and Net Zero goals while also supporting rural economy. The impacts of CCm's fertiliser products are in complete alignment with the goals of the ELM scheme: they allow farmers to make the transition to lower emissions and reduced environmental impact without risking their yields, without taking on additional costs and without needing to change their delivery mechanisms. As such, the use of zero carbon fertilisers represents a low-hanging fruit in terms of the achievement of ELMS objectives and farmers should be rewarded for their use. These products are commercial-ready and scalable and therefore available to be deployed at the pilot stage of the scheme to support the delivery of key public goods such as clean air, clean water and protection from environmental hazards.

3. Addressing ammonia pollution

In addition to the general greenhouse gas emission reductions enabled by this technology, it can also make a specific contribution to tackling ammonia pollution in line with the UK's commitments under the Convention on Long Range Transboundary Air Pollution and National Emissions Ceiling Regulations. Ammonia, which mixes with other atmospheric gases to form particulate matter which is then deposited with serious health and biodiversity implications, has remained at stable (and indeed increasing between 2013-2016) levels in the UK despite significant reductions in all other air pollutants. 87% of total UK ammonia emissions relate to agriculture, in particular from the spreading of fertilisers, manures and slurries and it has been estimated that halving ammonia from farming could avoid about 3000 deaths from air pollution in the UK each year. In the production of net zero carbon fertilisers, CCm's technology uses captured CO_2 to stabilise ammonia, thereby contributing to one of the primary sources of agricultural emissions.

4. Providing solutions for water companies: reducing water pollution and complementing biogas production

The UK Government has confirmed that it will prioritise the water quality of UK rivers, including by supporting Philip Dunne MP's proposed new Sewage (Inland Waters) Bill, in recognition of the risk sewage discharges pose to aquatic species and human health and recreation. Net zero carbon fertiliser technology, such as CCm's, can also support this objective by providing water companies with a cost-effective route for handling waste streams. With regards to wastewater treatment, CCm's technology is able to use nutrient-rich sludge digestate or centrate – a waste stream from the dewatering process – as the source of ammonia. This reduces and possibly eliminates the environmental and financial costs associated with transporting sludge and bio sludge to land, while also creating a completely new revenue stream through the sale of fertiliser. A separate application in the sewage sector extracts valuable nutrients such as phosphorus and ammonia from effluents, which are a major pollution risk when discharged into watercourses, and instead recycles these into biogenic fertiliser products. Net zero carbon fertiliser production can fit alongside the production of biogas through anaerobic digestion on water utility sites, drawing on low-value materials from such processes as inputs for transformation into commercial products.

5. Replacing horticultural sector's dependence on peat

The publication of a comprehensive England Peat Strategy is expected imminently, following a commitment in the 25 Year Environment Plan and the Chancellor's announcement in March 2020 of the Government's commitment to restoring 35,000 ha of peatland and investing in peat restoration through the £640 million Nature for Climate Fund. One of the major threats to the UK's carbon-rich peatlands is extraction of peat for use as a growing medium by the horticulture industry. Net zero carbon fertilisers and growing media such as CCm's can provide tailored solutions for horticultural needs, which could eliminate any need for peat extraction and support the achievement of Peat Strategy objectives.