EMISSIONS REDUCTION

Negative emissions could have a vital role to play in tackling the climate crisis, suggests *Will Gardiner*, CEO, Drax Group.

Negativity can be positive

Anyone who saw the stark warnings delivered by the climate scientists at the UN Intergovernmental Panel on Climate Change (IPCC) recently will know that the world is not doing enough to combat the global climate emergency. Its report made for grim reading. But we can't allow ourselves to become disheartened – instead, we need to double-down on our efforts to go further and do more to bring forward the technologies which will support the global efforts to decarbonise.

Climate science is clear – if average temperatures rise more than 1.5°C above pre-industrial levels, the impact will be catastrophic.

The UK government has set very ambitious targets to reduce emissions, with plans to cut greenhouse gas (GHG) emissions by 78% by 2035 compared to 1990 levels. Others are following suit, with US President Joe Biden announcing an ambitious 2030 emissions target and new Nationally Defined Contributions (NDCs) as part of his Leaders' Summit on Climate earlier this year.

Although reducing emissions will be key to achieving the 1.5°C target, *reducing* emissions can only prevent further warming. As a result, we need to start *removing* carbon dioxide (CO_2) from the atmosphere.

The role of negative emissions

It is widely recognised by leading climate scientists at both the UK's Climate Change Committee (CCC) and the UN IPCC that negative emissions technologies are vital to global efforts to combat the climate crisis, because they don't just reduce emissions, but can permanently remove CO_2 from the atmosphere.

The CCC's Sixth Carbon Budget found that around 58mn tCO_2/y would need to be removed from the atmosphere by 2050 using negative emissions technologies in order for the UK to reach its legally binding net zero target.

However, a recent report by the newly-formed Coalition for Negative Emissions (CNE; of which Drax is a founding member) found that if action isn't taken now to scale up negative emissions solutions, we are on track to miss our climate targets within a decade. According to the report, more than 1 Gt/y of negative emissions would be needed by 2025 to avoid irreversible climate damage. To put that into perspective, it is equivalent to removing more than twice the UK's annual CO_2 emissions each year for the next four years – which we are nowhere near achieving at the moment.

Utilising negative emissions solutions

Whilst there is no silver bullet or single technology that will fix the climate problem, there are cost-effective solutions that are ready to be deployed now and together will make a significant impact.

Bioenergy with carbon capture and storage (BECCS), direct air capture and storage (DACS), and natural climate solutions (such as afforestation) are each capable of delivering at least 1 Gt/y of carbon

Drax is planning to use bioenergy with carbon capture and storage (BECCS) at its Selby power station in North Yorkshire to create what it claims will be the world's biggest carbon capture in power project, capturing up to 8mn t/y of CO_2 by 2030

Photo: Drax Group

removals globally according to the CNE report.

When used alongside emissions reductions strategies, these negative emissions solutions are considered essential because they can help to offset emissions from other, difficult to decarbonise sectors like agriculture and aviation, and deliver the results the climate needs.

Creating the right support framework

In order to get BECCS and DACS projects underway, governments must develop and deliver the investment frameworks needed to create a new and enduring negative emissions sector.

Over the last 10 years the introduction of similar policy has incentivised investment and transformed the UK's energy system. Supportive UK government policies for technologies like offshore wind saw the country lead the world in creating a whole new industry, attracted significant investment, created thousands of jobs and decarbonised its electricity system faster than any other nation.

Negative emissions solutions are still in their infancy, but with similar support from government over the coming decade the UK could replicate the same success whilst supporting its carbon targets, clean growth and jobs, and also creating export opportunities.

What could support look like?

The UK's Department for Business, Energy and Industrial Strategy (BEIS) has outlined several key factors to consider in assessing how to make carbon capture, use and storage (CCUS) economically viable.

One of the primary needs for a CCUS business model is to instil confidence in investors – by creating a policy framework that encourages investment in innovative new technologies that reduce risk and inspire new entrants into the market.

The cost of developing a CCUS project should also be fairly distributed amongst contributing parties, ensuring that costs to consumers/taxpayers are minimised, as well as ensuring value for money.

However, currently there is no mechanism to support negative emissions in the energy or carbon markets. Current carbon pricing mechanisms are not set up to support the investment needed for early deployment of negative emissions projects, or in the timeframe required to keep the UK on track to meet its 2050 net zero goal.

A report from Frontier Economics, commissioned by Drax, looked at the various models that could be deployed to support negative emissions. It found that a new hybrid contract for difference (CfD)/carbon payment would be the best option because it would give investors the confidence to invest in this nascent industry. It would also allow time for current carbon pricing legislation to be amended – supporting the creation of a market-based approach for negative emissions and potentially removing the need for future subsidies.

Delivering BECCS at Drax

At Drax, we are planning to use BECCS at our Selby power station in North Yorkshire to create the world's biggest carbon capture in power project. Once up and running in 2027 it would capture millions of tonnes of CO_2 every year, permanently locking it away deep under the North Sea, whilst also generating renewable electricity for millions of homes across the UK.

We began our first BECCS trial back in 2018, the first project of its kind in Europe. Now, after a further successful trial, we have started the planning application process to build two BECCS units at the power station. Mitsubishi Heavy Industries has been selected as our technology partner to deliver BECCS – a significant milestone in moving the project forwards from being merely an ambition.

Once planning consent is granted, work to build the BECCS units could get underway, with the first unit up and running by 2027 and the second operating by 2030, collectively capturing at least 8mn t/y of CO_2. Drax would then become a carbon negative company – permanently removing more CO_2 from the atmosphere than is generated right across our operations.

BECCS won't just deliver for the climate, it can also deliver for the UK economy. A recent report by energy consultancy Baringa found that deploying BECCS at Drax could save the UK over £13bn in reaching its climate targets over the coming decade. Not only that, but it would support around 17,000 jobs during the peak of construction in 2028, including roles in construction, local supply chains and the wider economy.

The BECCS plant would also act as an anchor project for the Zero Carbon Humber initiative, which aims to create the world's first net zero industrial cluster. The Humber is the UK's most carbon intensive industrial region – so developing a CCUS and hydrogen industrial cluster here would have a significant impact on the UK's efforts to cut carbon whilst spearheading the creation and support of around 100,000 jobs.

Drax aims to be a carbon negative company – permanently removing more CO_2 from the atmosphere than is generated right across its operations – by 2030

Photo: Drax Group

Taking a global approach

The opportunities are not just limited to the UK. The climate crisis is a global issue and negative emissions technologies will need to be rolled out across the world.

Drax is already exploring options to roll out BECCS globally, looking at options alongside engineering, construction and project management specialist Bechtel. The joint study will focus on strategically important regions, including North America and Western Europe, as well as reviewing how to optimise the design of a BECCS plant using state-of-the-art engineering to maximise efficiency, performance and cost.

A further partnership with Swedish-based Phoenix BioPower, exploring how energy-efficient gas turbines could make newbuild BECCS projects more cost effective, is also underway as part of our long-term innovation programme.

Seizing the opportunity

Negative emissions technologies like BECCS are available now and have the potential to be a cornerstone of the global green economy.

The National Infrastructure Commission recently said negative emissions technologies could kickstart a whole new industrial revolution in the UK, creating and protecting thousands of jobs and putting the country at the forefront of ground-breaking, environmentally friendly technologies.

As the world looks to COP26 in Glasgow, the UK has an opportunity to show global leadership in support of these new green technologies. ●