

THE UK'S CROSS CUTTING NET ZERO STRATEGY – GREENHOUSE GAS REMOVALS

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In the sixth and final sector article of our Net Zero series, our team looks at what the UK's Net Zero Strategy ("the Strategy") means for the greenhouse gas removals ("GGRs") sector.

Chapter 3vii of the Strategy, titled "*Greenhouse Gas Removals: Balancing Residual Emissions to Achieve Net Zero*", sets out how the UK Government plans to reach net zero with the help of GGRs, otherwise known as carbon dioxide removal ("CDR") methods and negative emission technologies ("NETs"). The commitments made in Chapter 3vii have the potential to create both new technologies and job opportunities as well as an entirely new market for GGRs (coupled with robust and transparent carbon removal offsetting). GGRs offer a way forward for hard-to-abate sectors such as aviation, shipping, heavy industry, agriculture and waste to decarbonise completely by 2050. Exactly what commitments have been penned in the Strategy, at what cost and within which timeframes is discussed further below.

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WHAT ARE GGRS?

GGR is the name given to a group of methods to actively remove greenhouse gases, predominantly carbon, from the atmosphere. The range of GGR approaches fall broadly into two categories:

- nature-based approaches such as afforestation, reforestation, soil carbon enhancement and ecosystem restoration; or
- engineering-based approaches such as direct air carbon capture and storage ("DACCS"), bioenergy with carbon capture and storage ("BECCS"), marine carbon capture, biochar, mineralisation and enhanced weathering ("EW").

Whilst BECCS combine biomass with carbon capture and storage, DACCS use chemicals (known as sorbents) to capture CO₂ from the air.

There are numerous uncertainties and concerns regarding the use of GGRs, such as the ability to develop and deploy them at scale and the wider impact of such technologies on the environment, ecosystems, land and governance. One of the biggest concerns voiced against GGRs is that they have the potential to disincentivise emission reduction efforts and climate change mitigation. Nonetheless, it is also widely accepted among the supporters of GGRs that in prescribed, measurable, comparable and controlled conditions, they could play a major role in decarbonising energy-intensive industries, such as agriculture, transport, power and construction.

This article focusses on engineered removals and the potential they hold for creating a carbon removal offsetting market. Nature-based solutions, such as afforestation and soil carbon sequestration, are discussed in our previous [article](#) in this series *“The UK’s Cross-Cutting Net Zero Strategy: Natural Resources, Waste and F-gases chapter”*.

WHY DOES THIS MATTER?

The irreversible impact of climate change is well understood and palpably obvious. The ever urgent need to reduce greenhouse gas (“GHG”) emissions from all sectors, particularly from hard-to-abate sectors such as aviation, shipping, agriculture and heavy industries, is undeniable. On this basis the Strategy makes clear that there is evidence which suggests that GGR technologies could provide an opportunity to help meet the UK’s nationally determined contribution (NDC)¹ by 2030 and Carbon Budgets 5 and 6.² It is generally recognised in the UK and internationally that 1.5 degrees and net zero cannot be met without GGRs.

GGRS: KEY COMMITMENTS AND PROGRESS TO DATE

The Strategy sets out a number of commitments made by government in order to develop the GGRs market and technologies:

Key commitment: *Set the ambition of deploying at least 5 MtCO₂ /year of engineered removals by 2030, in line with Climate Change Committee’s (“CCC”) progress report to parliament 2021 and National Infrastructure Commission assessments.³*

Progress to date: The ambition has been set but many a barrier will now need to be overcome before it can be realised. CCC analysis indicates that engineered GGRs would be expected to deploy from 0 MtCO₂ today to at least 5 MtCO₂ by 2030, around 23 MtCO₂ by 2035 and 75-81 MtCO₂ by 2050. Higher and lower deployment will depend on sector-specific and wider economy developments.

Key commitment: *Deliver £100m innovation funding for direct air carbon capture and storage (“DACCS”) and other GGRs.*

Progress to date: Through the government’s Strategic Priorities Fund, UK Research and Innovation (“UKRI”) has pledged to invest £31.5m in five land-based GGR demonstrator projects and a central hub. The hub will lead on coordination across the programme, as well as conducting research on the environmental, economic, social, ethical and governance implications of GGR approaches. It is estimated that the programme’s pilot projects could remove between 100 and 1,000 tonnes of CO₂ per year in 2025 and have the potential to scale up to millions of tonnes by the 2030s. BEIS is also running a series of competitions into DACCS R&D projects. Further details are available [here](#) and [here](#) on R&D projects that have already been funded and on future competitions.

"GGR technologies could provide an opportunity to help meet the UK's nationally determined contribution (NDC) by 2030."

Key commitment: *Develop markets and incentives for investment in greenhouse gas removal methods, by consulting on preferred business models to incentivise early investment in GGRs, in 2022.*

Progress to date: The consultation on potential GGR business models is yet to be published. When published, it is expected to set out details of preferred mechanisms to incentivise early investment and enable commercial demonstration of a range of GGR technologies from the mid to-late 2020s. The consultation will consider how GGR incentives interact with policies and business models currently under development for carbon capture, use and storage, hydrogen production, sustainable

aviation fuels and other relevant sectors, along with wider carbon pricing policy. It will also consider how near-term policy incentives can most effectively leverage private investment and enable a transition towards a market-led framework as the sector matures. In the meantime, UK Government has published a Summary of Responses to the Call for Evidence in relation to GGRs (October 2021).⁴ Interestingly, the responses to the Call for Evidence already demonstrate the Contracts for Difference ("CfD") scheme to be the front-runner policy for delivering GGRs. This is based on its success in scaling deployment and reducing the cost of renewable technologies such as offshore wind. Many respondents noted parallels between GGRs and offshore wind, most notably the challenge of securing investment in capital-intensive technologies where longer-term cash flows are uncertain or volatile. Feed-in Tariffs are also identified as potentially viable mechanism for supporting deployment of GGRs having proven to be very effective in boosting the renewable energy in various countries. Lastly, the UK Emissions Trading Scheme (UK ETS) is also being explored as a potential long-term market for greenhouse gas removals. It remains to be seen however how much emphasis is placed on the above options in the much-awaited consultation once it is published.

Key commitment: *Working in partnership with the devolved administrations, we will aim to launch a call for evidence in the coming months exploring the role of the UK ETS as a potential long-term market for GGRs, as part of the upcoming consultation on the UK ETS.*

Progress to date: On 25 March 2022, the UK Government jointly with devolved administrations, launched a consultation entitled "Developing the UK Emissions Trading Scheme".⁵ Chapter 8 of the consultation specifically deals with GGRs. The consultation closes on 17 June 2022. It is thought that UK ETS could be the most effective mechanism for scaling up the GGRs market as it would allow polluters to pay for removals where they cannot fully decarbonise. It would also allow polluters to trade carbon removal offsets provided the highest principles of responsible carbon removal offsetting are adhered to such as the ones set out by the University of Oxford in "The Oxford Principles for Net Zero Aligned Carbon Offsetting".⁶ The consultation sets out how there are several potential opportunities that including GGRs into the UK ETS could provide, the main one being that of sending the right market signal to businesses to invest in new low-carbon technologies and drive the price down of GGR technologies.

Key commitment: *Explore options for regulatory oversight to provide robust monitoring, reporting and verification ("MRV") of GGRs, following the recommendations of the BEIS-led MRV Task & Finish Group involving experts from industry and academia.*

The effectiveness of GGRs and carbon removal offsets is highly dependent on the ‘durability’ and ‘permanence’ of those removals. To ensure that the removed carbon is stored long-term and not rereleased, a robust monitoring, reporting and verification system will need to be put in place to measure progress. In relation to emissions reduction, an MRV system provides a framework for effective measurement and understanding of the sources of emissions and trends in order to design appropriate mitigation strategies, assess the on-going effectiveness of such strategies and support their market credibility and public perception. How exactly this will work is subject to further consultations, research and discussions.

Progress to date: In 2021, the UK GGR MRV Task and Finish Group, comprised of cross-industry and government experts, recommended that an independent audit authority be set up to oversee the MRV. This would ensure that the amount and permanence of removals are quantified, robustly and transparently.⁷ Chapter 8 of the UK ETS consultation (see above) also invites views on how to develop an MRV system which monitors, reports and verifies negative emissions that will support the development and delivery of GGRs.

Key commitment: *Seek an amendment to the Climate Change Act to enable engineered removals to contribute to UK carbon budgets.*

Progress to date: Currently the Climate Change Act 2008 only recognises removals from land use, land use change and forestry (“LULUCF”) as counting towards UK’s carbon budgets. Engineered removals are not yet in scope. For this reason, the government plans to propose legislative amendments to the Climate Change Act 2008 in order to expand the definitions. No legislative amendments have yet to be published however.

WHAT ARE THE RISKS AND OPPORTUNITIES?

Research and development of GGR technologies at scale will be costly. GGRs are associated with high capital and operational costs. Investors will need a lot of persuasion and assurance before they will commit any investments. This is mainly due to lack of an established market and current lack of customer demand for engineered removals. It remains to be seen whether the funds committed by the Government towards R&D into GGRs will be sufficient to generate at least some interest and uptake. Significantly more funding will need to be allocated if the government is serious about delivering GGR solutions. By way of comparison, the European Commission has an established Innovation Fund⁸ of up to €10bn to develop GGR technologies. In March 2022, it launched its second call for small-scale projects – projects with total capital costs below €7.5m – including those of energy storage and CCUS. The second round of funding available would be up to €100m. Projects are evaluated against (i) their potential to avoid GHG emissions; (ii) their innovation (with the call, the European Commission has changed such assessment to compare against the existing technologies in the country where the project would be implemented, rather than across the EU); (iii) their financial and technical maturity (with the expectation that the project is sufficiently mature); (iv) their potential for scaling up; and (v) their cost efficiency.

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Assuming that the existing financial and market barriers can be overcome, and assuming more funding streams can be found in the future (e.g. via proceeds from UK ETS), there are other risks that will need to be factored in such as the likelihood of more regulatory restrictions being placed on hard-to-abate industries; tighter environmental regulation being introduced to balance potential adverse impacts on the environment, particularly land use and food stocks; and changes to planning or land laws to permit land use for GGR projects.

Furthermore, the Strategy recognises that successful GGR deployment is heavily dependent on sustainable biomass. The upcoming Biomass Strategy, expected in 2022, will review the amount of sustainable biomass available to the UK and set out a framework for how this resource can be best utilised across the economy to help achieve net zero target.

In terms of opportunities, in addition to scaling up the GGR sector and creating a robust and transparent carbon removal offsetting market, GGRs are also expected to regenerate communities and open up new employment opportunities across the UK. Furthermore, GGRs create a way forward for hard-to-abate sectors to decarbonise completely by 2050. These include international aviation, shipping, heavy industry, agriculture and waste. GGRs will therefore be essential to compensate for the residual emissions arising from these sectors.

HOW WILL PROGRESS BE MEASURED?

At present, the risks far outweigh the likely opportunities for the GGR sector. The biggest risk of all is making sure that GGRs do not become a substitute for ambitious mitigation for net zero. The key measure of success will be substantiated evidence of consistent and steady removal of emissions in the GGR sector based on the commitments made in the Strategy and on whether those commitments are actually delivered. The take up of the government incentives on offer and continued investment by funds and other investors in the GGR sectors will also speak volumes as will the actual number of green skilled jobs that are generated to show whether the market in this area is growing at a steady pace.

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[1] The NDC is a percentage commitment to reduce GHG emissions with corresponding mitigation strategies and plans to achieve such reduction by signatories to the Paris Agreement. The UK has updated its NDC figure as of December 2020 to an economy-wide GHG reduction of at least 68% by 2030, compared to 1990 levels.

[2] Under the Climate Change Act 2008 (the “**Act**”), the UK Government is obliged to set five-yearly carbon budgets, 12 years in advance, from 2008 to 2050, and to consider the advice of the Committee on Climate Change (also created under the Act) when setting such budgets. Each budget places a restriction on the total amount of GHG emissions the UK is permitted to emit over that five-year period. The original target of the Act when enacted was an 80% reduction of GHG emissions compared to 1990 levels. The Act was amended in 2019 in line with the Net Zero Strategy to increase this to a 100% reduction. The fifth carbon budget was set at a 57% reduction in annual UK emissions over the period between 2028 and 2032, relative to 1990. The sixth carbon budget increased this to 80% for the period between 2033-2037 and will, for the first time, include emissions from aviation and shipping.

[3] CCC (2021), ‘2021 Progress Report to Parliament’ and National Infrastructure Commission (2021)

<https://www.theccc.org.uk/publication/2021-progress-report-to-parliament/> and ‘Engineered greenhouse gas removals’,

<https://nic.org.uk/app/uploads/NIC-July-2021-Engineered-Greenhouse-Gas-Removals-UPDATED.pdf>

[4] “Greenhouse Gas Removals: Summary of Responses to the Call for Evidence”

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026494/ggr-cfe-summary-of-responses.pdf

[5] “Developing the UK Emissions Trading Scheme”

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1067125/developing-the-uk-ets-english.pdf

[6] https://www.sustainabilityexchange.ac.uk/files/oxford_offsetting_principles.pdf

[7] <https://www.gov.uk/government/publications/monitoring-reporting-and-verification-of-ggrs-task-and-finish-group-report>

This report brought together Industry and Academics to recommend how UK Government should approach the MRV of negative emissions resulting from various GGR methods and outlines the crucial need for the establishment of MRV protocols across the broad range of GGRs to be robust and rigorous.

[8] The Innovation Fund is one of the first EU funding instruments supporting the development and deployment of low-carbon technologies in its Member States required for the EU to reach its goal to be climate neutral (net-zero GHG emissions) by 2050. The fund aims to provide financial incentives for investment in such technologies and supports the phases between the pilot of technology through to demonstration and scale-up. The fund is financed by revenues from the auction of emission allowances between 2020 and 2030 under the EU’s Emissions Trading System. See our previous article on this topic here:

<https://www.wfw.com/articles/a-greener-voyage-navigating-emissions-trading-schemes-for-the-maritime-sector/>

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