

Written evidence submitted by Drax

Drax Group plc (Drax) owns and operates a portfolio of flexible, low carbon and renewable electricity generation assets. At the Drax Power Station in North Yorkshire we have been trialling Bioenergy with Carbon Capture and Storage (BECCS) to produce negative emissions following the conversion of most of the power station to operate using sustainably sourced biomass in place of coal. Drax can deliver 8 MtCO₂ of negative emissions as part of phase 1 of the Drax BECCS programme in the 2020s, which unlocks future investment from Drax and other BECCS and Negative Emission Technology (NET) developers and provides technical learnings which will enable these technologies to grow in the UK and globally, throughout the 2030s.

Drax is also a founding member of the Zero Carbon Humber initiative which aims to develop a Carbon Capture and Storage (CCUS) network in the UK's largest industrial cluster to enable industrial and power decarbonisation, hydrogen production, and negative emissions. Zero Carbon Humber, as part of a wider consortium with Net Zero Teesside, was recently selected as one of the UK's first two carbon capture and storage clusters under the East Coast Cluster partnership.

We welcome the opportunity to help inform the EAC's inquiry into NET technologies and would welcome the opportunity to provide oral evidence to the committee.

NETs are vital to achieve net zero in the UK with the Climate Change Committee estimating at least 58 MtCO₂ of negative emissions from 'engineered' NETs such as BECCS will be needed to offset residual positive emissions from sectors such as aviation and agriculture. Action from government is required in the near term to ensure initial deployment from the mid-2020 so that that this ambition can be delivered for the period 2040-2050.

Beyond providing both negative emissions and renewable power, BECCS (and other NETs) can provide significant socioeconomic benefits in the regions in which they are deployed. The deployment of BECCS at Drax alone could support over 10,000 jobs at its peak and we have recently announced our ambition to ensure that at least 80% of our supply chain for the deployment of BECCS is sourced from the UK.

The deployment of NETs will be highly reliant on favourable government policy to enable investment in first-of-a-kind projects such as the Drax BECCS project, and to ensure scale up of NETs in line with net zero trajectories. In particular, we would like to highlight the following points from our response:

- **BECCS is essential:** NETs are widely recognised as essential in the UK's path to net zero particularly for offsetting emissions from hard to decarbonise sectors with BECCS seen as the main method of delivering these negative emissions. Implementation of BECCS at the Drax Power Station would, with one project, provide virtually all of CO₂ removals required in the UK by 2030. This means we can deliver on the government's ambition of at least 5 MtCO₂/yr of engineered Greenhouse Gas Removals by 2030 set out recently in the Net Zero Strategy.
- **Carbon Storage:** The UK has a wealth of offshore carbon storage potential which makes it one of the most favourable places for NET roll out in the world. With NETs considered essential in the decarbonising hard to decarbonise sectors like aviation, agriculture, and industry, the roll out of CO₂ transport and storage networks prior to the completion of the first CCUS units in the UK will be vital for a scalable, successful roll out to meet the UK governments future carbon budgets.

- **Removals targets:** The government should look to develop long-term targets for NET deployment in the UK beyond the recently announced ambition for 5 MtCO₂ per year by 2030. We welcome the targets set out in the Net Zero Strategy; however, we would welcome more clarity on how removals can contribute to carbon budgets and the 2050 net zero target. We would also like to see a framework to deliver on these targets to provide greater certainty to investors and see NETs scale up more rapidly.

Please find detailed answers to individual questions relevant to Drax appended to this letter.

Yours sincerely,

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Chief Innovation Officer

Drax Group plc

Appendix

Q1 - What contribution could NETs (through DACCS, BECCS, and/or other NETs) make to achieving net zero by 2050?

- In the table below the CCC's balanced pathway¹, the National Grid's ESO Future Energy Scenarios consumer transformation pathway² (the least ambitious for CCS), the Royal Society and Royal Academy of Engineering³, National Infrastructure Commission⁴ and the Government's Net Zero Strategy⁵ are compared to demonstrate the expected contribution of NETs in achieving net zero by 2050.

	2030	2035	2040	2050
CCC Balanced Pathway	5 MtCO ₂	22 MtCO ₂	38 MtCO ₂	58 MtCO₂ 53MtCO ₂ to come from BECCS
National Grid ESO Consumer Transformation	5 MtCO ₂	28 MtCO ₂	50 MtCO ₂	78 MtCO₂
Royal Society and Royal Academy of Engineering	-	-	-	75MtCO₂ 50MtCO ₂ to come from BECCS
National Infrastructure Commission	5MtCO ₂ – 10MtCO ₂	15MtCO ₂ – 25MtCO ₂	-	40MtCO₂ – 100MtCO₂
Net Zero Strategy	5 MtCO ₂	23MtCO ₂	-	75-81 MtCO₂

- The reports outlined clearly showcase the crucial role that engineered NETs will play in a decarbonised economy, with the rollout of these technologies commencing in 2030 at the latest. Across each of the reports highlighted, BECCS provides the lions share of the negative emissions required. For example, the CCC estimate that BECCS provides over 90% of their estimates of negative emissions needed to reach net zero by 2050.

Q2 – Which 'hard to decarbonise' sectors could benefit most from NETs, and which should be prioritised?

- Drax is a founding member of the Coalition for Negative Emissions⁶, who bring together developers and potential beneficiaries of NETs across all sectors with the aim of scaling up and deploying NETs as quickly as possible to reach our collective

¹ <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>

² <https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2020-documents>

³ <https://royalsociety.org/-/media/policy/projects/greenhouse-gas-removal/royal-society-greenhouse-gas-removal-report-2018.pdf>

⁴ <https://nic.org.uk/studies-reports/greenhouse-gas-removals/>

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1028157/net-zero-strategy.pdf

⁶ <https://coalitionfornegativeemissions.org/who-we-are/>

net zero goals, this includes representatives from the aviation and agricultural sectors. Given our breadth of expertise, we have unique insight into the scale of the challenges faced in reaching climate targets. We also have expertise in how to address those challenges in a way that will allow economies and sustainable industries to thrive. Our goal is not just to decarbonise, but to decarbonise while ensuring continued economic progress. To do this, negative emissions will be essential.

- In the UK's Net Zero Strategy published this month (October) the government recognises that NETS will 'play a critical role in balancing residual emissions from the hardest to decarbonise sectors such as aviation, agriculture and heavy industry'. It is also clear that it expects reductions and removals to contribute to net zero and that the progress of one should not impede on the other. In the CCC's 2050 balanced pathway scenario agriculture and aviation represent the two largest residual emissions sectors totalling 55MtCO₂ which must subsequently decarbonise via NETS.
- NETs are also recognised by trade organisations such as Sustainable Aviation who suggest that in order for aviation to reach net zero by 2050, NETs will have to be deployed at scale removing 28 MtCO₂ per year from the aviation sector alone. Work with industry to ensure UK carbon removal solutions are eligible for airline investment through CORSIA⁷ would be an effective way for aviation to ensure it benefits from NETs.
- Similarly, the National Farmers Union in their Achieving Net Zero strategy⁸ outline how BECCS will reduce CO₂ emissions by 26 MtCO₂ per year to help agriculture decarbonise.
- This indicates that in both aviation and agricultural sectors rely on NETs to reach net zero by 2050 alongside other mitigation methods. The deployment of NETs provides a route to decarbonise both sectors to decarbonise despite technical and natural constraints meaning they cannot fully eliminate emissions by 2050.

Q3 - At what technological stage are current NETs, and what is the likely timeframe that will allow NETs to be operational at scale in the UK?

- BECCS power is at technology readiness level (TRL) 8, and Drax are ready to deploy BECCS at scale subject to a favourable government policy framework and the deployment supporting CO₂ transport and storage infrastructure.
- Biomass combustion has been proven at large commercial scale, the largest being each of Drax's 670MW Thermal power Generation Units (TRL9), and equally there are a number of post-combustion CCUS facilities also in operation around the world⁹.
- Drax has already piloted various forms of liquid solvents and has undertaken third party validation testing at the SINTEF research facility in Norway to re-affirm that BECCS is ready to deploy.
- Drax can take a Final Investment Decision on BECCS subject to an appropriate investment framework which properly rewards the production of negative emissions.
- As outlined in our earlier table, there will need to be a significant scale up of BECCS and other NETs from the late 2020s and into the 2030s. The deployment of the Drax BECCS project, is the first step to realising this ambition, and will put the UK on track to meet its carbon budgets and net zero target.

⁷ https://www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf

⁸ <https://www.nfuonline.com/nfu-online/business/regulation/achieving-net-zero-farmings-2040-goal/>

⁹ <https://www.globalccsinstitute.com/resources/global-status-report/>

Q4 – What are, and have been, the barriers to further development of NETs? How can such barriers be overcome?

- Drax has proven the technical capabilities of BECCS through the operation of pilot facilities at the Drax power station and holds the view that the remaining barriers to deployment are commercial in nature rather than technical. We are actively looking at ways to mitigate these barriers and have been encouraged by recent government announcements such as the awarding of the East Coast Cluster as a ‘Track-1’ cluster, and the announcement that a business model for NETs will be consulted on in Spring 2022.
- The primary barrier to deploying NETs at scale is that carbon markets are not mature, are unable to provide a revenue stream for negative emissions or cannot provide price certainty to make most GGR projects investable. Negative emissions are not rewarded through schemes like the UK-ETS or EU-ETS, and, whilst voluntary markets are beginning to develop, these are currently immature markets. In order to support the deployment of NETs at the scale required to meet net zero and interim carbon budgets a government policy framework is required to support their early deployment, and to encourage the development of carbon markets to support negative emissions over time.
- In addition to commercial barriers to deployment there are several other barriers to deploying NET technologies. These include the need for a CO₂ transport and storage infrastructure certainty for which both BECCS and DACCS are reliant. We were pleased to see that the East Coast Cluster was recently announced as a ‘Track 1’ CCUS cluster. Subject to continued government support, the East Coast Cluster could deploy a CO₂ transport and storage network by the mid-2020s.
- Highly skilled jobs requiring a specific skill set will be required with BECCS at Drax itself supporting on average 8,000 direct, indirect and induced jobs per year during construction between 2024 to 2031, peaking at over 10,000 jobs in 2027¹⁰. We are working closely with local suppliers to ensure that these skills gaps can be met and that our supply chain is as UK-based as possible¹¹.

Q5 - What are the trade-offs between availability of land and availability of sustainable biomass to make NETs a viable option in and beyond the UK?

- The UK has some of the strongest biomass sustainability criteria in the world, which Drax believes is fit for purpose. Since publishing the 2012 Bioenergy Strategy, the UK Government has introduced mandatory sustainability criteria for solid and gaseous biomass used for heat and power generation. These criteria set out what types of land the biomass must be sourced from and what GHG emissions savings must be achieved. For woody biomass, the land criteria include requirements to protect soil, water, biodiversity, and ecosystems, maintain the productivity of the area and have regard to traditional rights of tenure and land use. The Coalition for Negative Emissions with support from McKinsey published a report into NETs earlier this year which details how even with stringent sustainability filters, BECCS and Natural Climate Solutions can still provide gigatonne-scale negative emissions by 2030¹².

¹⁰ <https://www.drax.com/carbon-capture/capturing-carbon-at-drax-delivering-jobs-clean-growth-and-levelling-up-the-humber/#chapter-1>

¹¹ https://www.drax.com/press_release/drax-announces-80-british-supply-chain-ambition-to-support-construction-of-worlds-largest-carbon-capture-project/

¹² <https://coalitionfornegativeemissions.org/wp-content/uploads/2021/06/The-Case-for-Negative-Emissions-Coalition-for-Negative-Emissions-report-FINAL-2021-06-30.pdf>

- The EU's Joint Research Centre (JRC) concluded in its research¹³ earlier this year that REDII regulations covers the majority of potential negative outcomes from the use of woody-biomass. UK regulations build on REDII, which is a helpful affirmation that the UK engages in the sourcing of good biomass. It also reaffirms the effectiveness of the controls which have been in place in the UK for many years.
- At Drax, we go beyond legislated sustainability requirements with our own science-based, transparent sustainable sourcing policy which places strong controls on our biomass (alongside independent external audits), closely monitors our supply chain and sourcing locations and ensures close relationships with our suppliers¹⁴. Our sourcing policy (heavily scrutinised by the Independent Advisory Board¹⁵) covers our core sustainability values on protecting biodiversity, reduction of greenhouse gas emissions and contribution to social values and is in line with the UK's Forest Research recommendations, widely considered to be the industry gold standard. We also work with NGOs and non-profits to understand the socioeconomic impacts and benefits of where we source our biomass. This means that regardless of where biomass is sourced from it must meet this gold standard and ensures our biomass is sustainable.
- For sustainable biomass to be produced in the UK, any policy must ensure that land carbon stocks are not negatively impacted by biomass sourcing as we ensure for our imported woody biomass from forests. A robust sustainability framework will be required to ensure that direct and indirect impacts of the GGR on land use emissions are protected against and, where possible, technologies should be promoted where they serve to increase carbon stocks.
- We are currently undertaking research which looks at the potential for domestic sourcing of biomass. This includes ensuring that UK sourced biomass can meet our stringent sustainability criteria and looking at the potential size of the UK market.

Q6 - What are the options for the storage of captured carbon, whether onshore or offshore?

- The UK has one of the largest offshore storage capacities of any country which we believe is sufficient for UK demand without the need to use onshore storage which faces complex social barriers to deployment. The Global Carbon Capture and Storage Institute have outlined that the UK has at least 87 appraised CO₂ storage sites across 5 geological basins with a potential of up to 500 sites¹⁶. Total with a potential storage capacity in UK storage could be as high as 78 Gt of CO₂¹⁷, it is therefore evident that the UK has an abundance of offshore storage options available for any carbon capture and storage scenario (beyond just NETs).
- **T&S Infrastructure:** The development of CO₂ transport and storage infrastructure is particularly vital for the deployment of NETs. We were pleased to see the East Coast

¹³ European Commission Joint Research Centre Policy Report. The Use of Woody Biomass for energy production in the EU, Camia A et al, 2021. Available here: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC122719/jrc-forest-bioenergy-study-2021-final_online.pdf

¹⁴ Drax Group Responsible Sourcing Policy, 2019. Available here: <https://www.drax.com/sustainable-bioenergy/responsible-sourcing/>

¹⁵ Drax Group, Independent Advisory Board on Sustainable Biomass. Available here: <https://www.drax.com/sustainability/sustainable-bioenergy/independent-advisory-board-on-sustainable-biomass/>

¹⁶ https://www.globalccsinstitute.com/wp-content/uploads/2020/07/Global-Storage-Resource-Assessment_-2019-Update_-June-2020.pdf

¹⁷ http://www.CO2stored.co.uk/home/about_faq

Cluster announced as a successful 'Track 1' CCUS cluster. With continued government support this should ensure that a CO₂ T&S network will be available for use, but it is important we keep up the pace of T&S roll out in the coming years to meet this (and other CCUS) ambition.

Q7 - What other drawbacks for the environment and society would need to be overcome to make NETs operational?

- The potential drawbacks for NETs are far outweighed by the benefits of deploying these technologies. However, industry and government must work together to ensure that public confidence in NETs is built.
- We would welcome clarity on the long-term targets relating to NETs from government post-2030. We welcomed the targets set out in the Net Zero Strategy; however, we would welcome more clarity on how removals can contribute to carbon budgets and the 2050 net zero target.
- Drax is of the opinion that the current sustainability criteria for biomass does not require significant reform, although we acknowledge that some developments will be needed to ensure it remains fit for purpose as demand for biomass feedstock increases. Drax is of the view that long-term government commitment to whole-system, science-led sustainability governance, along with industry transparency, will ensure the governance arrangements remain fit for purpose. This includes:
 - **Increasing transparency** – by refining monitoring techniques and requiring more detailed data gathering – especially for larger operators. Regulators and policymakers would be able to access a more holistic (and realistic) view of for example, where biomass is sourced from and the individual types of feedstock used, which will not only provide extra assurance of sustainability but will also enable more informed decision making as the criteria develops in the future.
Increased supply chain transparency and data requirements could also be an appropriate next step for smaller users of biomass.
 - **Social requirements** – developing and improving social requirements around biomass sustainability are particularly complex. We have recommended to the government that they engage with organisations that have already undertaken work in these areas, such as Sustainable Biomass Programme (SBP).
 - **Certification** – We have also recommended that the government should more proactively engage with certification schemes, such as that of SBP. When considering where to strengthen the current criteria they should look to align legislation with that of the stricter sustainability criteria in these voluntary schemes.
- Importantly however, any changes to the criteria must not hinder current well working approaches to sustainable biomass provision and reforms should not discourage common good practice.
- Drax is committed to providing greater levels of detail and with our own science-based, transparent sustainable sourcing policy. The Monitoring, Reporting and Verification of GGRs task and finish group report¹⁸ released this year called for the

introduction of an independent function to sit between project developers and government. This function should be responsible for the creation and administration of an independent MRV regime to ensure that the amount and permanence of removals are quantified, robustly and transparently and we would welcome this approach.

Q8 - Given the proposed role of NETs in climate change modelling, is there a danger of over-reliance on these technologies in net zero strategies?

- A number of organisations including the IPCC and CCC have said that negative emissions alongside emissions reductions will be essential for the UK to reach net zero. One of the primary criticisms around the deployment of NETs is that the negative emissions produced can reduce the need to establish decarbonisation strategies for certain sectors of the economy. We agree with the IPCC and CCC that the deployment of NET technologies will be complementary to mitigation of emissions and should not serve as a replacement for decarbonisation where suitable alternatives to high carbon processes exist.
- It is essential to start deploying negative emissions technologies now if they are to be available at scale. Hence the need for clear policy incentives that support NET deployment we have referred to throughout our response. With the East Coast Cluster this year named as one of the UK's first CCUS clusters the UK has the opportunity to become a global leader in developing and deploying NETs.
- Lastly, in the longer term if we want to go beyond net zero and actively start to reverse some of the damage caused by climate change, negative emissions are the only option to achieve this as this requires us to actively reduce the volume of CO₂ in the atmosphere
- For these reasons, we do not believe there is an over-reliance on NETs in net zero and decarbonisation strategies.

Q9 - How should the UK Government support the further development of NETs?

- **Bespoke support for First-of-a-kind (FOAK) projects:** The primary objective of any market mechanism will be ensuring that revenue certainty can be established, particularly for FOAK projects. Negative emissions markets are not yet mature enough, or able to reward the deployment of negative emissions. This will need to be addressed to ensure that investors can have the confidence to make investments in NET projects. We believe that for a BECCS power project the most efficient mechanism to achieve this would be a dual power CfD and negative emissions payment. However, over time we would expect NETs to transition away from bespoke mechanisms for initial FOAK projects and the role of the ETS and voluntary markets will be important to support a continued pipeline of projects. We expect the government's biomass strategy and consultation on a business model for NETs to outline this approach in detail.
- **Voluntary markets:** The Taskforce on Voluntary Carbon Markets has produced a comprehensive report setting out recommendations for actions required for this market to develop and achieve scale. This includes the establishment of key criteria and standards, and a governance body to oversee both the sale and purchase of carbon offsets and removals. Government should work with international bodies to ensure there are robust standards in place, and that there is appropriate governance of those who sell and purchase carbon offsets and removals on voluntary markets.

- **Shared Infrastructure:** For CCUS enabled NET technologies such as BECCS and DACCS these technologies are reliant on the availability of a CO₂ transport and storage network to safely transport and store the captured CO₂. The development of T&S networks in the UK is moving at pace and the East Coast Cluster being successful in our application to become a 'Track 1' cluster. However, the government must continue to support the development of clusters if our NET (and wider CCUS) ambition is to be met.

Q10 - What policy changes, if any, are needed to ensure the UK gains a competitive advantage and remains at the cutting edge of this sector?

- Contractual mechanisms to support BECCS and DACCS are needed to facilitate the deployment of NETs. Under a mechanism for deployment, revenue streams will need to be secured in order to provide attractive to investors. We would welcome further clarity from government on a mechanism to deploy NETs as soon as possible, through both the upcoming Biomass Strategy and consultation on a business model for NETs as outlined in the government's Net Zero Strategy.
- With BECCS and DACCS expected as the first NETs to be built in the UK, the market must ensure that there is a supply chain operational by the time the first projects are constructed in 2027. Government policy will be critical to ensuring sufficient time to enable these supply chains to develop, and clarity over deployment of NETs is needed to facilitate this development.

Q11 - The Government has indicated it will publish a Biomass Strategy in 2022, including the role of BECCS. What should be included in this strategy?

- **The biomass strategy should outline a commitment to deploying BECCS in the UK.** The recent Net Zero Strategy highlighted that the Biomass Strategy will outline how BECCS could be deployed in the UK. This, combined with the consultation on a business model to support NETs, as also outlined in the strategy, should provide a clearer steer on BECCS deployment in the UK.
- **Government should aim to build on existing bioenergy sectors and in doing so provide increasing support for biomass end uses which result in the best carbon abatement outcome, deliverability in terms of scale now and cost-effectiveness.** Biomass should also be encouraged where the end use results in technological advancement and innovation that puts the UK at the forefront of action taken to tackle climate change and is exportable in a post-Brexit world. BECCS meets this criteria and government support in 2021 via a dual payment mechanism is required to make this a reality.
- **The UK's current sustainability criteria for biomass is world leading and already more than mitigates risks.** This is because it takes a multi-layered approach to safeguarding sustainability, building on the EU's Renewable Energy Directive (RED) to include UK-specific requirements, as set out in UK policy regimes. This is in addition to regulator-approved, voluntary certification schemes which certify compliance with strict requirements on sourcing and emissions reporting (such as SBP, FSC). As such, we are of the position that the current criteria does not require any reform, but we do acknowledge that some developments will be needed to ensure it remains acceptable as demand for sustainable biomass feedstock increases globally. Long-term government commitment to whole-system, science-led sustainability governance, along with increased industry transparency, will ensure governance arrangements remain fit for purpose

- **Accounting and reporting of emissions from biomass must continue to pay due regard to the IPCC 2006 Inventory Guidelines, including the refinements carried out in 2019.** In doing so, biogenic carbon emissions must continue to be reported in the land use (LULUCF) sector and be rated zero in the energy sector to avoid the double counting of emissions, as stated by the IPCC. The key principle in relation to accounting for any captured carbon from an industrial process is to ensure that the process CO₂ emissions are accounted for to a high degree of accuracy utilising a system, such as an Emissions Trading System (ETS), underpinned by the science and guidance of the IPCC. Again, this would retain the current IPCC accounting principle underpinning the utilisation biomass in relation to its zero-emission factor, allowing any CO₂ captured from biomass associated industries to produce negate emissions.

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