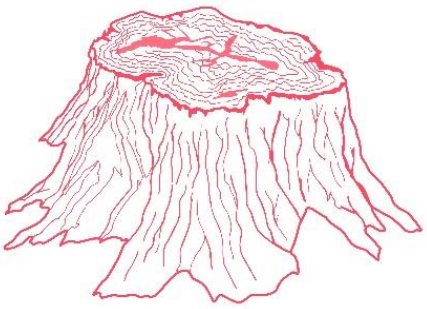
CUT CARBON NOT FORESTS



Parliamentary Briefing
Bioenergy with Carbon Capture & Storage (BECCS)

Bioenergy with carbon capture and storage (BECCS) is proposed by some as a way of drawing CO_2 out of the atmosphere, thus allowing continued burning of fossil fuels and forest biomass. However, BECCS is unproven, environmentally damaging, and a costly distraction from the urgent task of reducing emissions at the source. There is no basis to assume that BECCS can deliver 'negative emissions' after full carbon accounting for biomass-burning in the power sector. Instead, there is significant basis to believe that reliance on large-scale biomass use for BECCS would come at an untenable ecological cost.

The UK Government is rolling out policies to achieve 'net zero' emissions by 2050. It is also developing its COVID-19 recovery plan and has stated that a green recovery will be at the core. A climate or economic recovery plan that relies on BECCS is not credible and would likely result in climate targets being missed and wasteful spending of scarce public funds.

This briefing sets out a number of key issues with BECCS:

- BECCS is not inherently carbon negative because bioenergy is not inherently carbon neutral.
- There are no examples of functioning or scaleable BECCS projects involving biomass combustion.
- BECCS requires significant land and agrochemical inputs, which would have negative impacts on food security, agriculture and biodiversity.
- BECCS diverts policy support and finance away from readily available and proven climate solutions.

What is BECCS?

BECCS stands for bioenergy with carbon capture and storage. In theory, BECCS would generate energy by burning biomass (such as wood harvested from forests) and then capture the CO_2 released during combustion, storing it underground.

BECCS relies on the premise that because forests and other plants absorb carbon as they grow, bioenergy is 'carbon neutral.' When biomass is burned in a power station, capturing and sequestering emitted CO_2 would thus make the process 'carbon negative'—i.e. it would result in carbon being drawn out of the atmosphere. However, the underlying premise itself is flawed; bioenergy is rarely carbon neutral.

Bioenergy is not carbon neutral

BECCS proponents claim that biomass can be a 'carbon neutral' substitute for fossil fuels. Indeed, BECCS can only be carbon negative if bioenergy is carbon neutral—or at least very low-carbon.

The assumption of carbon neutrality is based on trees and other plants absorbing CO_2 from the atmosphere as they grow, arguably making up for the CO_2 emitted from biomass harvest and combustion. However, when biomass is burned in large quantities in a short time this no longer holds true, and bioenergy becomes a net CO_2 emitter on a scale comparable to fossil fuels. **Because most biomass electricity generation results in increased CO_2 emissions, adding CCS to these plants does not result in net CO_2 removal from the atmosphere.**

Biomass plants like Drax Power Station generate climate pollution in two places: (1) at the smokestack where burning biomass emits more CO_2 than burning coal; and (2) from the land, where increased wood harvest replaces mature forests with young saplings, reducing forest carbon sinks, and foregoing carbon sequestration that would otherwise occur. Taken together, studies show that biomass electricity generated from burning forest biomass results in higher concentrations of CO_2 in the atmosphere for decades—far outside the timescale for GHG reductions required to meet Paris Agreement targets or limit warming to 1.5° Celsius.[1] This is the case even when biomass comes from genuine forestry residues.[2]

Further, vast quantities of wood are needed to generate a proportionally small amount of energy. Drax burns the equivalent of 127% of the UK's entire wood production every year (all of it imported) yet meets less than 0.8% of the UK's primary energy demand.[3] Drax's electricity-only biomass plants have an efficiency of roughly 38%. Thus, for every ten trees cut down for burning, six are wasted on producing uncaptured heat.

BECCS is an unproven technology, even according to Drax[4]

BECCS technologies have not been proven to result in negative emissions at any scale. The only working example of a type of BECCS technology is carbon capture from ethanol fermentation. However, the amount of CO_2 emitted from the fossil fuel-reliant refinery is far greater than the amount of CO_2 captured and stored, making the process far from carbon neutral or negative.

In the absence of an ethanol industry, BECCS in the UK would have to be linked to biomass combustion. Flue gases from a biomass combustion plant, such as Drax Power Station, contain a mix of gases with CO_2

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[1] Spatial Informatics Group, "The Carbon Impacts of UK Electricity Produced by Burning Wood Pellets from Drax's Three U.S. Mills," May 27 ,2019, https://www.southernenvironment.org/uploads/publications/2019-05-27_Drax_emissions_-_SIG_report_Phase_II.PDF.

[2] Mary Booth, "Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy," Environmental Research Letters, February 21, 2018, iopscience.iop.org/article/10.1088/1748-9326/aaac88.

[3] Total UK wood production in 2019 was 11.1 million tonnes: https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/. At a 2:1 tonnes conversion, Drax burned equivalent of 14.1 million tonnes of green wood, generating 13.4 TWh of electricity: drax.com/wp-content/uploads/2020/03/Drax_AR2019_Web.pdf. The UK's final energy demand in 2019 was 142.7 mtoe, equal to 1,659.6 TWh: gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes.

[4] "The technologies and materials that we are evaluating including BECCS and other viable, alternative fuels are new and unproven. Any one of the technologies and materials that we evaluate could prove technically or commercially unfeasible or flawed." Drax, "Enabling a Zero Carbon, Lower Cost Energy Future," 2020, https://www.drax.com/wp-content/uploads/2020/03/Drax_AR2019_Web.pdf. (pg. 58)

being highly diluted. This makes it more difficult and energy intensive to capture. CCS has never been demonstrated at any scale with biomass plants. To date, the only existing pilot project in the world aims to capture just one tonne of carbon a day.[5]

BECCS has implications for land use, agriculture, and biodiversity in the UK

Producing biomass for burning in BECCS plants requires large areas of arable land. The Committee on Climate Change (CCC) has said that any climate mitigation from BECCS is conditional on stricter rules around biomass sourcing and its hierarchy of use. Given ongoing controversy over the UK's current biomass supply chains, the CCC recommended a major shift towards domestic sourcing of biomass fuel.

Meeting biomass demand for BECCS could have large and controversial impacts for rural communities. A key scenario modelled by the CCC assumes biomass is grown on 0.7 million hectares of land by 2050—equal to converting roughly 15% of UK cropland to produce energy crops.[6] This could not only set back efforts to deploy nature-based climate solutions at scale but could also have serious implications for agricultural practices in the UK. Reducing the land available for food production would cause either a greater intensification of agriculture or a reduction in agricultural output. An intensification of agriculture in combination with monoculture biomass plantations would significantly damage biodiversity.

Focus on reducing fossil fuels, investing in true clean energy, and forest restoration

To address the climate emergency, rapidly phasing out fossil fuel burning is vital, but climate science shows that we must also remove large amounts of CO_2 already in the atmosphere. Large-scale wood-burning sacrifices opportunities to remove atmospheric CO_2 because it requires harvesting trees, whereas maximal CO_2 removal is achieved by letting forests grow.

The UK's long experiment with biomass electricity has shown that it exacerbates climate change, threatens forests, and diverts resources from low-cost, low-risk and readily available alternatives. Instead of wasting money on an unproven technology like BECCS, the Government should invest in energy efficiency, batteries, and proven technologies such as solar and wind. In addition, protecting forests and restoring peatlands and wetlands are the most effective and proven ways of sequestering carbon. Beyond pulling CO_2 out of the air and storing it in organic materials, these approaches can secure food supplies, improve the resilience of ecosystems and communities and enhance biodiversity.

No technology that pumps more carbon into the atmosphere or destroys forests should be receiving subsidies. Bioenergy does both. As the UK works to address the climate emergency and recover from the COVID-19 pandemic, the Government must redirect existing subsidies for biomass electricity and no new public funds should be used to support BECCS at Drax Power Station or elsewhere.

This briefing was prepared by environmental NGOs campaigning for the end of biomass subsidies in the UK.[7] For more information, or to speak to representatives of the Cut Carbon Not Forests coalition, please contact ccnf@cutcarbonnotforest.org.

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[5] Drax, "Europe's first bioenergy carbon capture and storage pilot now underway," https://www.drax.com/press_release/europes-first-bioenergy-carbon-capture-storage-pilot-now-underway/.

[6] Committee on Climate Change, "Land Use: Policies for a Net Zero UK," January 23, 2020, https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/.

[7] Our members include: Biofuelwatch, Dogwood Alliance, NRDC, and the Southern Environmental Law Center.