Public Accounts Committee Inquiry into Carbon Capture, Usage and Storage – Biofuelwatch submission

Introduction

i. This evidence is submitted on behalf of Biofuelwatch, a UK and US-based environmental organisation which provides information and undertakes campaigning in relation to the climate, biodiversity, human rights and public health impacts of large-scale industrial bioenergy.[1] This submission will focus on Bioenergy with Capture Capture and Storage (BECCS).

ii. Our evidence shows that any government funding for BECCS projects at UK power stations like Drax would be extremely expensive for bill payers, would fail to deliver negative emissions and would lead to severe harm to forests, wildlife, communities and the climate.

iii. Consultation proposals by the previous Government to extend renewable subsidies to give wood-burning companies more time to develop BECCS, which is unproven at scale, could potentially cost the UK public over £4 billion (if the subsidies are extended for only 3 years) or £12 billion if they are extended to 2035. [2]

iv. According to the consultation, wood-burning companies like Drax would not be obliged to capture and store carbon emissions in order to receive the new subsidies but would be able to continue burning imported wood for many years to come.

v. If granted, the new subsidies would waste public money by locking the UK into long-term funding for biomass burning.

vi. Instead, the Government should support the protection and restoration of forests and use the green energy budget to fund genuine renewables like wind and solar power in order to create new green jobs and tackle both the climate and nature emergencies.

1. BECCS will not provide negative emissions and will exacerbate the climate crisis

1.1 Claims by wood-burning companies that BECCS could deliver 'negative emissions' rely on the assumption that burning wood to generate power is carbon neutral. However, a large and growing majority of scientific evidence shows that burning wood in power stations like Drax in Yorkshire and Lynemouth in Northumberland is not carbon neutral and the assumption of carbon neutrality is based on a misinterpretation of Intergovernmental Panel on Climate Change (IPCC) guidance. [3]

1.2 Burning wood releases significant carbon dioxide that is not offset for decades until trees eventually regrow, if they ever do. These timescales far exceed critical climate tipping points.

1 https://www.biofuelwatch.org.uk/

2 https://assets.publishing.service.gov.uk/media/65a8170db2f3c6000de5d4d3/transitional-support-mechanism-large-scale-biomass-generators-consultation.pdf

3 https://www.sciencedirect.com/science/article/pii/S0301421512001681

1.3 Drax is the UK's single largest carbon emitter and the power station emitted over 11 million tonnes of carbon dioxide in 2023.[4] As over 500 scientists have warned, burning trees for energy is undermining global climate goals:

"*regrowth takes time the world does not have to solve climate change. As numerous studies have shown, this burning of wood will increase warming for decades to centuries. That is true even when the wood replaces coal, oil or natural gas.*" [5]

1.4 There is also strong evidence that burning trees in power stations is making the climate and ecological crises worse by sourcing wood from biodiverse and primary forests[6] which act as essential carbon sinks to sequester emissions.

1.5 The European Academies Sciences Advisory Council (EASAC) states that burning wood for energy "is not effective in mitigating climate change and may increase the risk of dangerous climate change".[7] When forests are logged, the trees release their stored carbon into the atmosphere and lose the ability to sequester more carbon.

1.6 Releasing even a small percentage of this stored carbon or reducing the amount of carbon our forests absorb from the air will make it infinitely harder to avoid climate breakdown. Preliminary findings last month by an international team of researchers showed that forests, plants and soil absorbed almost no carbon in 2023 and urgent action is needed to reduce greenhouse gas emissions and increase carbon sequestration in order to avoid reaching: "*a dangerous level of warming at which natural CO2 sinks may no longer provide to humanity the mitigation service they have offered so far by absorbing half of human induced CO2 emissions*."[8]

1.7 The Climate Change Committee stated in its 2023 report on delivering a Reliable Decarbonised Power System that there should be no role for large-scale unabated biomass generation beyond the expiry of existing subsidy support in 2027 and that "sustained use of large-scale biomass generation is not compatible with the path to Net Zero." [9]

1.8 Recent research by the Spatial Informatics Group has shown that even if Drax installed carbon capture technology on all four of its operating units, the power station will keep raising the levels of carbon emissions in the atmosphere until the 2050s if it continues burning wood:

'Results indicate that the proposed UK BECCS system would in fact lead to more CO2e in the atmosphere than the baseline scenario without the BECCS system until approximately 2053, due to the more intensive forest management regime associated with additional wood pellet demand

4 https://ember-energy.org/latest-updates/the-uks-largest-single-source-of-co2-emissions-is-a-wood-burning-power-station/
5 https://www.documentcloud.org/documents/20482842-scientist-leter-to-biden-van-der-leyden-michel-suga-moon-february-11-2021
6 https://www.biofuelwatch.org.uk/wp-content/uploads/Drax-in-BC-report.pdf
7 https://easac.eu/media-room/press-releases/details/easac-welcomes-that-the-jrc-report-strengthens-the-case-for-shorter-payback-periods-on-woody-biomass/
8 https://arxiv.org/pdf/2407.12447
9 https://www.theccc.org.uk/wp-content/uploads/2023/03/Delivering-a-reliable-decarbonised-power-system.pdf

to feed the BECCS plant. It finds that the impact of the CCS technology is far smaller than the impact of wood pellet sourcing on forest carbon stocks and flows.'[10]

1.9 In addition it is unclear whether 'negative emissions' if they are achieved in the UK by burning wood imported from other countries, would even be credited to the UK's carbon budget. The IPCC is going to produce by 2027 a methodology report on carbon dioxide removal technologies. It is therefore premature to make financial investments which assume that the UK carbon budget would be the beneficiary of any 'negative emissions.' [11]

1.10 Reliance on large-scale implementation of BECCS from forest biomass could therefore undermine the Government's climate goals announced at COP29 to reduce emissions by 81% by 2035.[12]

2. The high cost of the BECCS programme

2.1 If it were to go ahead, Bioenergy with Carbon Capture and Storage at a power station like Drax would be extremely expensive, with analysis from the climate think tank, Ember, finding that Drax would require up to £43.34 billion in subsidies over 25 years to recover the high costs of converting its power plant units to BECCS. [13]

2.2 According to Drax's 2023 annual report, the useful economic life of its biomass power station will be exhausted by 2039. Achieving a commercial return on the capital expenditure needed to implement carbon capture in such a short timeframe would mean more costly electricity and therefore a higher demand for subsidies.

2.3 Since 2018, UK wind power generation has risen by over 47% and solar power by 9.6%, even in the face of policies discriminating against new onshore wind and solar that have been overturned by the new government.[14]

2.4 Despite Drax receiving more than £1 billion annually in revenue for trading Renewables Obligation Certificates and additional amounts of between £0.6 and £0.8 billion in direct subsidy payments, the power station's electricity generation and contribution to UK electricity declined when it was most needed during the recent energy crisis as the company chose not to operate its Unit 1 generator and instead used other generators that did not have production caps.[15]

2.5 Adding carbon capture technology would further reduce Drax's electricity generation for the grid since, according to Drax's own figures, more than one quarter of its electricity would be needed to run the carbon capture technology. At the same time, Drax's profits, underwritten largely by UK subsidies, have significantly increased.[16] These subsidies have allowed the company to increase its pellet production in North America and its sale of pellets to other

10 https://sig-gis.com/wp-content/uploads/2024/10/SIG-BECCS-LCA-report-2024.pdf
11 https://www.ipcc.ch/2024/06/18/nominations-scoping-meeting-cdr/
12 https://www.gov.uk/government/news/uk-shows-international-leadership-in-tackling-climate-crisis
13 https://ember-energy.org/latest-insights/draxs-beccs-project-climbs-in-cost-to-the-uk-public/
14 https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2024
15 https://www.power-technology.com/news/drax-costs-consumers-unit-1/
16 https://ember-energy.org/latest-updates/drax-profits-rise-as-electricity-generation-falls-show-new-figures/

countries, whilst also growing its shareholders' wealth through share buy backs and increased dividends.

2.6 While the cost of wind and solar energy has continued to decrease, the cost of operating large biomass power stations like Drax has not declined, and is not forecast to decline, because it is tied to a highly competitive international wood pellet market.

2.7 "Transitional subsidies" could cost as much as £2.5 billion a year, according to the Impact Assessment that accompanied the consultation. To put this in context, the Secretary of State for Energy Security and Net Zero has announced that the next Contracts for Difference (CfD) auction will make a record £1.5 billion available for new renewable electricity.[17]

2.8 Transitional subsidies, and potential future subsidies for BECCS at Drax, and possibly Lynemouth, could thus exceed the annual budget available for all new offshore wind and other renewable electricity projects by as much as 60%.

2.9 This would divert a large share of financial support away from genuine climate solutions that could lower energy costs and reduce carbon emissions such as wind and solar power, tidal energy, energy storage and heat-and transport-electrification.

3. Lack of progress in implementing BECCS.

3.1 The technology-readiness of implementing carbon capture and storage from burning wood is significantly behind what Drax and the previous government have claimed and carbon capture from biomass combustion has not so far been demonstrated at anything like the scale envisaged.

3.2 Drax has presented post-combustion BECCS as a proven technology that could be easily implemented. Similarly, the previous government claimed in 2022 that power-BECCS had a high technology-readiness level, especially when it comes to retrofitting existing plants.[18] This was reflected in its 2023 Biomass Strategy, which says that post-combustion carbon capture technology is "proven to work", putting it at a Technology-Readiness Level (TLR) 8-9. [19]

3.3 In order for a technology to have reached TLR 8, it must have been "completed and qualified through test and demonstration".[20] However, Drax has only ever undertaken very small-scale solvent testing. During its very short trial of only 90 days - the only trial that has been publicly announced - Drax captured a total of just 27 tonnes of CO2.[21]

17 https://www.gov.uk/government/news/record-breaking-funding-for-clean-energy-in-britain
18 https://assets.publishing.service.gov.uk/media/62f4b8e7e90e076cfcd5420e/power-beccs-business-model-consultation.pdf
19 https://assets.publishing.service.gov.uk/media/64dc8d3960d123000d32c602/biomass-strategy-2023.pdf
20 https://www.ukri.org/councils/stfc/guidance-for-applicants/check-if-youre-eligible-for-funding/eligibility-of-technology-readiness-levels-trl/
21 https://www.biofuelwatch.org.uk/2021/drax-beccs-response/

3.4 Drax's claim that it can capture 8 million tonnes per year by 2030 is 73,000 times higher than what was achieved by the pilot project. As Drax admitted in its response to questions raised at the time of the pilot project, they gained only limited information from the trial.[22]

3.5 For example, the trial did not assess the 'parasitic' energy penalty to run carbon capture where the technology uses up a large share of the electricity the power station produces. As far as we are aware, Drax has undertaken no further tests related to its proposed BECCS project and has not announced any planned ones.

3.5 Moving directly from a 3-months micro-trial to a multi-million tonne carbon capture project without any interim stages appears highly implausible. There has been no successful implementation globally of power station carbon capture from either fossil fuel or biomass at the scale proposed for Drax and Lynemouth.

3.6 It is therefore misleading to categorise post combustion BECCS as a 'proven technology'.

3.7 Only one post-combustion carbon capture project worldwide has been cited as evidence that carbon capture from biomass has been demonstrated. A 2021 report commissioned by the last government stated that: "*The demonstration-scale BECCS Mikawa Power Plant (50 MW) in Japan commenced operations in late 2020, now capturing 500 tons of CO2 a day*." [23]

3.8 In reality, according to the operators, Toshiba, this demonstration project was stopped in March 2021 after just five months.[24] Despite extensive online research and two queries emailed to Toshiba, we have been unable to obtain information about the amount of CO2 actually captured at that plant. Toshiba has not announced any further carbon capture plans at Mikawa, nor at any other biomass plant.

3.9 A 2022 review by the UK Carbon Capture Research Centre about post-combustion carbon capture states that: "*Biomass retrofits and new-build also face additional challenges because of the impurities in the flue gas. While these will be at acceptable levels for emission to the atmosphere, they may cause unacceptable consequences in the PCC unit, i.e. from particulates, SOx and NOx.*" [25]

3.10 Given the significantly different composition of flue gases produced by burning coal or wood, it is not credible for Drax to argue that their proposed technology has been proven when most of the worldwide operational experience of post carbon capture relates to coal burning, not biomass.

3.11 There are only two coal plants around the world with carbon capture technology: Boundary Dam in Canada and Petra Nova in Texas, USA. Each of these plants is far smaller than a single

22 https://www.biofuelwatch.org.uk/2021/drax-beccs-response-december21/
23 https://assets.publishing.service.gov.uk/media/616ea53e8fa8f5297d57de5d/investable-commercial-framework-power-beccs.pdf
24 https://www.global.toshiba/ww/news/energy/2021/09/news-20210910-01.html
25 https://ukccsrc.ac.uk/wp-content/uploads/2023/01/BAT-for-PCC_v2_EfW_web-1.pdf

Drax unit and neither of them has achieved such high carbon capture levels as Drax is promising. Nor have they met the operators' carbon capture goals.[26]

3.12 Lynemouth Power has not so far launched a consent application for carbon capture, while Drax stopped testing carbon capture after only capturing 27 tonnes of CO2 and it is proposing no further development work or demonstration projects.

4. Longer-term deployment of BECCS

4.1 Transitional subsidies were proposed on the basis that Drax and possibly Lynemouth Power would use the extra years of funding post-2027 to develop large-scale BECCS.

4.2 The previous Government's consultation proposals for transitional subsidies did not include any means of holding companies that receive the subsidies to account if they fail to develop and deploy carbon capture.

4.3 There is no obvious legal mechanism for drafting a Contract for Difference subsidy that would require companies that receive transitional subsidies to repay this public money if carbon capture technology is not developed. It is also important to note that these wood-burning companies would only be responsible for the 'capture' element of BECCS and that other companies would be responsible for storing the carbon emissions.

4.4 Even if the technology were implemented by the biomass generators, and the essential carbon transport and storage elements were implemented by others, the subsidies to finance BECCS would be so expensive (estimated by Ember to be £43 billion over 25 years)[27] that it would be economically unviable to operate.

4.5 As a result, the proposed BECCS installations could become stranded assets and a waste of public money.

4.6 This money could instead be used to fund genuine renewable energy like wind and solar power, and the development of the electricity grid, which would support the creation of new green jobs and help to tackle both the climate emergency and the cost of living crisis.

5. Transitional subsidies and BECCS would continue harm to nature

5.1 Any transitional subsidies for wood-burning companies would further exacerbate the harm to forests and nature from logging to supply wood to burn in power stations like Drax. The large majority of the pellets Drax and Lynemouth burn are imported from the southeastern USA, followed by Canada, and the remainder mostly from European countries.

---

26 https://ieefa.org/resources/two-years-behind-schedule-boundary-dam-3-coal-plant-achieves-goal-capturing-4-million and https://ieefa.org/resources/ill-fated-petra-nova-ccs-project-nrg-energy-throws-towel (Note that the Petra Nova plant was restarted under a new owner in September 2023, but that no information about carbon capture rates has been published).

27 https://ember-energy.org/latest-insights/draxs-beccs-project-climbs-in-cost-to-the-uk-public/

5.2 Wood for those pellets is routinely sourced from clearcutting of species-rich coastal hardwood forests in the Southeastern USA in an area designated as a Global Biodiversity Hotspot.[28] Logging for wood pellets in these forests is already having a devastating impact on rare and endangered species, including black bears and at least 30 species of birds that are the focus of conservation efforts such as the Wood Stork, the Chimney Swift, and the Rusty Blackbird.[29]

5.3 In Canada biomass is sourced from the Boreal forest, degrading important habitat for imperilled species such as the caribou. February 2024 investigations by Biofuelwatch, Conservation North, Bulkley Valley Stewardship Coalition and the BBC show that Drax is continuing to source trees from Primary and Old Growth forests – some of which are over 250 years old – to make wood pellets in Canada.[30]

5.4 In Europe, the UK's biomass comes from countries such as Estonia where 5,700 hectares of forests that are of "Woodland Key Habitat" quality, but that are not formally protected, have been logged, including for wood pellets. Logging licences have also been issued for over 82,000 hectares of forests within Natura 2000 areas intended to protect rare and imperilled species.[31]

5.5 Ofgem recently concluded an investigation into whether Drax's wood sourcing from British Columbia may have violated biomass sustainability criteria. The investigation found that Drax was in breach of annual profiling reporting requirements relating to the Renewables Obligations ("RO") scheme and other related matters, resulting in Drax paying a £25 million voluntary fine.[32]

6. Transitional subsidies and BECCS would cause further harm to communities

6.1 Further subsidies for the burning of wood in UK power stations would also cause greater harm to communities in the U.S Southeast who are already suffering pollution and severe health impacts from the wood pellet mills that supply Drax and other UK power stations.[33]

6.2 Wood pellet mills release PM2.5 air pollution (fine dust), nitrogen oxides, and volatile organic compounds which, according to the American Lung Association, are associated with a wide range of health issues.[34] In 2022, Drax was accused of driving 'environmental racism' after settling air pollution violations at its pellet mills in Louisiana[35] and a recent investigation by The Times found that Drax is sourcing fuel from six American wood pellet plants that have broken environmental regulations more than 11,000 times since 2014.[36]

---

28 https://www.cepf.net/stories/announcing-worlds-36th-biodiversity-hotspot-north-american-coastal-plain
29 https://www.cutcarbonnotforests.org/wp-content/uploads/2023/06/global-markets-biomass-energy-devastating-us-forests-202306.pdf
30 https://www.biofuelwatch.org.uk/wp-content/uploads/Drax-in-BC-report.pdf
31 https://www.cutcarbonnotforests.org/wp-content/uploads/2022/08/Biomass-Sourcing-in-Estonia.pdf
32 https://www.ofgem.gov.uk/publications/ofgem-decision-investigation-drax-power-limited
33 https://mississippitoday.org/2024/09/12/drax-receives-another-fine-for-air-pollution-violations-in-gloster/
34 https://www.lung.org/clean-air/indoor-air/indoor-air-pollutants/residential-wood-burning
35 https://unearthed.greenpeace.org/2022/09/26/drax-accused-environmental-racism-further-pollution-claims-against-wood-pellet-mills-us/
36 https://www.thetimes.com/uk/environment/article/us-plants-supplying-uk-power-station-broke-green-rules-11000-times-2q559pwrg

6.3 Meanwhile, an investigation by Land and Climate Review, as reported by BBC Newsnight in May 2024, found that Drax has breached environmental laws 189 times at its Canadian pellet mills.[37]

6.4 A further health concern is that the carbon capture process involves the use of amines which can result in harmful degradation products, including nitrosamines, for which there is insufficient data on health impacts.[38] We advise that a cautionary approach should be taken to their use.

7. Conclusion

7.1 BECCS is a dangerous distraction from the climate solutions that would reduce emissions to the atmosphere with immediate effect and could be implemented now. The costs of BECCS is such that it will take limited funds away from genuine climate solutions. BECCS involves the continued destruction of one of our best allies in the fight against climate change - trees.

7.2 Transitional subsidies are incompatible with the Government's commitment to decarbonise the electricity system by 2030[39], given that Drax's supply chain fossil fuel emissions alone are higher than what the then government stated in 2018 would be acceptable for new Contracts for Difference. Transitional subsidies would allow Drax and possibly Lynemouth Power to continue receiving billions of pounds more in subsidies for burning wood without any carbon capture.

7.3 The continued burning of wood for energy would go against 2023 advice from the Committee on Climate Change, which said that there should be no post-2027 subsidies for unabated large-scale biomass electricity. It would also undermine the government's commitment to reduce energy costs and carbon emissions by diverting large amounts of support from genuine climate solutions such as wind and solar power or energy storage.

7.4 The proposed transitional subsidies would be better spent by reducing energy demand, for example by insulating homes in the UK or in the electrification of heating.[40] This would reduce UK carbon emissions, lower energy bills, create new green jobs and support those in fuel poverty.

37 https://www.landclimate.org/drax-mills/
38 https://www.sciencedirect.com/science/article/abs/pii/S1750583613003502
39 https://lordslibrary.parliament.uk/renewable-energy-costs/
40 https://trinomics.eu/project/government-subsidies-for-electricity-generation-and-combined-heat-and-power-chp-from-solid-biomass/