



BioEnergy with Carbon Capture and Storage (BECCS): A Dangerous Distraction from Meaningful Climate Action

**A briefing from Biofuelwatch and Friends of the Earth Scotland
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Bioenergy with Carbon Capture and Storage (BECCS) is proposed by some as a way of drawing carbon dioxide out of the atmosphere. However, BECCS is unproven, unjust and a dangerous distraction from the urgent task of reducing emissions at source.

The Scottish Government is currently developing an update to the Climate Change Plan, and proposes to develop BECCS in Scotland in order to reach negative emissions in the electricity sector. The government is also developing its recovery from Covid-19, and has stated that a green recovery will be at the core. A climate plan or economic recovery plan which relies on BECCS is simply not credible, and would likely result in climate targets being missed.

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

- There are no known examples of functioning or scalable BECCS projects involving biomass combustion.
- BECCS is not inherently carbon- neutral or carbon- negative.
- Proposed BECCS plants in Scotland would require building new, unevidenced and large biomass plants that would be extremely expensive.
- BECCS requires significant land and agrochemical inputs which would have negative impacts on agriculture and biodiversity.
- BECCS distracts from the urgent transformation needed and diverts policy support and finance away from readily available solutions that have been proven to reduce emissions.

What is BECCS?

BECCS stands for Bioenergy with Carbon Capture and Storage. In theory, BECCS would generate energy from burning biomass (such as wood) and then capture the carbon dioxide released during this burning process, storing it underground.

BECCS is based on the premise that because plants absorb carbon as they grow, bioenergy is carbon neutral, and that capturing and sequestering CO₂ from burning biomass or biofuels would therefore make it 'carbon negative', i.e. that the whole process would result in carbon

being drawn out of the atmosphere. However, this is a flawed and dangerous assumption – BECCS is rarely carbon neutral.¹

Bioenergy is not carbon neutral

Proponents of BECCS claim that biomass can be a carbon neutral substitute for fossil fuels. However, BECCS can only be carbon negative if bioenergy is carbon neutral or at least very low carbon. This proposition is based on the net transfer of CO₂ from the atmosphere into the growing biomass that takes place during photosynthesis.

When biomass is burned in large quantities in a short time this no longer holds true, and bioenergy becomes a net contributor of CO₂ emissions on a scale comparable to fossil fuels.

² Studies have shown that biomass energy generated from forestry residues is not compatible with the timescale for greenhouse gas emission reduction required to meet the Paris Agreement goal of keeping global warming to 1.5 degrees.³

Furthermore, vast quantities of wood are needed to generate a proportionally small amount of energy. Drax currently burns the equivalent of 125% of the UK's entire wood production every year (all of it imported) yet meets less than 0.9% of the UK's primary energy demand.⁴ Drax's biomass units are amongst the most efficient electricity-only biomass plants in the world – at around 38% efficiency. This means that for every 10 trees cut down for burning, 6 are wasted entirely on producing uncaptured heat.

BECCS is not a proven technology

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 CO₂ emitted from the fossil fuel reliant refinery is far greater than the amount of CO₂ captured and stored, making the process far from carbon-neutral or negative.⁵

In the absence of an ethanol industry, BECCS in Scotland would have to be linked to biomass combustion. Flue gases from a biomass combustion plant contain a mix of gases with CO₂ being highly diluted. This makes it more difficult and energy intensive to capture and at present, there are no known examples of this process being successfully demonstrated anywhere in the world.

BECCS has implications for land use, agriculture and biodiversity in Scotland

Producing biomass for burning in BECCS plants requires large areas of arable land. There is currently no publicly available information on the scale and type of biomass proposed for Scotland. However, the land-use required to deliver net-negative emissions from the entire electricity sector, in line with the Scottish Government's vision for BECCS, would

¹ <https://www.pfpi.net/biomass-energy-has-big-climate-impact-even-under-best-case-scenario>

² <https://onlinelibrary.wiley.com/doi/10.1111/gcbb.12643>

³ iopscience.iop.org/article/10.1088/1748-9326/aaac88

⁴ drax.com/wp-content/uploads/2019/03/Drax-Annual-report-accounts-2018.pdf (Drax generated 13.8 TWh of electricity from burning wood in 2018 (h). The UK's total energy demand that year was 154 million toe, which is 1,663.09 TWh)

⁵ carbonbrief.org/analysis-negative-emissions-tested-worlds-first-major-beccs-facility

undoubtedly be significant. The UKCCC estimates that 22% of UK agricultural land could be freed up for afforestation, biomass crops as well as soil restoration.⁶

This could have significant implications for agricultural practices in Scotland. Reducing the land available for food production would cause either a greater intensification of agriculture or a reduction in agricultural output. This latter impact would necessitate an increase in food imports which would in turn lead to an increase in emissions. An intensification of agriculture in combination with monoculture biomass plantations in Scotland would significantly damage biodiversity due to the conversion of biodiverse forests to plantations and the heavy reliance of both processes on agrochemicals.

The most recent State of Nature 2019 reports found that biodiversity is already facing an emergency in Scotland and the abundance of species is falling at a faster rate in Scotland than in the rest of the UK.⁷

Scotland is committed to the UN's Sustainable Development Goal 15⁸ to halt and reverse land degradation and biodiversity loss, and planting more monoculture conifer plantations to be burned in power stations could undermine this goal.

Focus on reducing fossil fuels and forest restoration

The majority of biomass energy production in Europe involves burning wood, and the scale of demand for wood for energy means that much of it is met by cutting down trees. New trees will take decades to sequester as much carbon as a mature one felled. Rapidly phasing out fossil fuel burning is vital, but climate science shows that we do need to reduce CO₂ already in the atmosphere now. Leaving forest ecosystems to grow and restoring peatlands and wetlands are the most effective proven ways of actually sequestering carbon from the atmosphere.⁹

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⁶ carbonbrief.org/coc-one-fifth-of-uk-farmland-must-be-used-to-tackle-climate-change

⁷ <https://nbn.org.uk/stateofnature2019/reports/https://nbn.org.uk/stateofnature2019/reports/>

⁸ <https://sdgs.un.org/goals/goal15>

⁹ <https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full>