Bioenergy Crops

In principle the use of bioenergy is an effective measure to support a transition to net zero carbon. For example, instead of leaving food waste, sewage and animal manure to degrade in landfill, releasing methane and other greenhouse gases, you can contain it, use micro-organisms to digest it for energy, and capture the gas.

In practice, it is not so simple. As well as waste products, both annual (e.g. maize, wheat, oilseed rape, sugar beet) and perennial (e.g. miscanthus, willow) crops are grown specifically for bioenergy. These purpose-grown energy crops make up around 32% of feedstock inputs into UK Anaerobic Digestion plants. The area of land used to grow bioenergy crops in the UK is increasing, from 40,000ha in 2008 to 129,000ha in 2017 (c2% of UK arable land). In 2017, 87% of the area used to grow bioenergy crops was under maize or wheat compared to 5% under miscanthus.[1]

More fundamentally, bioenergy is often presented as 'negative emissions technology'. For bioenergy to have negative emissions, the greenhouse gases released in its combustion must be captured from the air and stored securely. Additionally, the fossil fuel saving must outweigh the GHG footprint of crop production in the first place before it can even be carbon neutral. This process is known as Bioenergy Carbon Capture and Storage, or BECCS. The problem is that there is no known technology that can achieve this at the scale proposed. Currently, bioenergy is simply a fossil fuel substitute, reducing CO_2 emissions but also reducing the carbon sink potential of the land.

The Committee on Climate Change has proposed that up to 1.2 million hectares of perennial bioenergy crops should be grown in the UK by 2050, or nearly 20% of the current croppable area.[2] They project that this could reduce CO_2 by 2MtCO_2e, although this is dwarfed by the CO_2 reductions from actions such as restoring peatlands, trees and hedgerows, and soil management.[3]

The NFFN is further concerned about the cultivation of bioenergy crops because it can:

- **Lead to land use changes that result in net CO_2 emissions and biodiversity loss,** e.g. conversion of habitat to cropped land or direct harvesting of forest trees, which has led to losses of swamp forest in North America to fuel Drax plants.[4]
- **Compete with other land uses,** such as habitat restoration, and force farming to become more intensive with more damaging inputs to produce enough food.
- **Displace food production.** Demand for food is increasing, and bioenergy projections require significant utilised agricultural area. Displacing food production outside the UK would just export our ecological footprint. Assumptions are made about the potential to increase yields to avoid the need to increase the area, but this is rarely backed up by robust evidence.[5]

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[1] Defra (2019). Crops Grown For Bioenergy in the UK: 2017.
[2] NB the CCC's modelling relies heavily on the use of perennial (E.g. Miscanthus, Eucalyptus) rather than annual crops (e.g. maize, wheat, rye, sugar beet), which is significant in terms of carbon storage.
[3] Committee on Climate Change (2018) Land use: Reducing emissions and preparing for climate change.
[4] Howe, F (2017) No Drax! There's nothing 'sustainable' about big biomass.
[5] For example, the Committee on Climate Change assume that yields on Miscanthus and Willow will increase from 12 oven-dried tonnes (odt)/hectare to 15-20 odt/hectare by 2050. However, this is just an assumption.

- **Incentivise the cultivation of soil-damaging crops**, such as maize, which can lead to soil erosion, compaction and run-off, increasing the risk of water pollution and flooding. Tighter regulatory standards are required to reduce these issues.
- **Incentivise the use of fertiliser and pesticide inputs**, for example to grow maize. It is crucial that our reliance on inorganic fertilisers is significantly reduced to reach net zero carbon.
- **Prevent us from closing the nutrient loop**, even when utilising crop by-products for anaerobic digestion, these nitrogen-rich materials could instead be added back onto the land to reduce artificial fertiliser use.