

Written evidence from Straw Innovations

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- What contribution could NETs (through DACCS, BECCS, and/or other NETs) make to achieving net zero by 2050?
- Which ‘hard to decarbonise’ sectors could benefit most from NETs, and which should be prioritised?

Agriculture should not need NETs for its own emissions. Since its emissions are largely part of the carbon cycle already, they could be offset by enhancing natural carbon sinks such as tree planting for timber products or peatland restoration. Indeed, with biochar or BECCS, agriculture could become a net generator of carbon dioxide removal credits.

The main focus for NETs (with carbon storage measured in centuries at least) should be for remaining fossil fuel use where the cost of changing the infrastructure is highest and there are few alternatives. At the moment, that looks like aviation, steel making, perhaps the last 10% of the electricity sector when the other 90% is intermittent renewables with storage and that final 10% is disproportionately expensive to decarbonize. Once targets have been set with caps on emissions, eventually the market will decide where the NETs are used.

- 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?

There are technologies in the UK at about TRL 6 or 7 which, with the right policy environment, could be at 9 in a few years and operating at national scale by the end of this decade.

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

For DACs, cost is the main factor. For BECCS via gasification, gas processing has traditionally been one of the key stumbling blocks (e.g. tars, gas cleaning). For biochar, safety and consistency of quality are issues. For fermentation, there is usually a pure CO₂ stream but not necessarily near a site where it can be stored, so transport is a barrier. For all of them, the infrastructure / pipelines to store liquified CO₂ is lacking, but biochar avoids that issue by storing carbon in the soil instead.

- What, if any, are the links and co-benefits to other technological innovations, such as sustainable aviation fuel or sustainability in the energy sector?
- 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?

This is my specialist area. I have written major reports for the UK Government on this, and with the UN FAO on the topic of “Integrated Food-Energy Systems” (IFES).

Unsustainable biomass production can compete with food production and forests, with catastrophic consequences. But sustainable biomass production, such as in IFES, can have positive synergies. There are broadly two types of IFES: 1) Agroforestry systems in which trees benefit crops and generate additional biomass. 2) ‘Cascading’ use of biomass, e.g. crop residues used for ‘combined heat and biochar’ production in which the heat is used for drying and preserving the crop (for other examples, see my report with FAO called “Making Integrated Food-Energy Systems Work for People and Climate” <https://www.fao.org/family-farming/detail/en/c/286638/>).

- What are the options for the storage of captured carbon, whether onshore or offshore?
- What other drawbacks for the environment and society would need to be overcome to make NETs operational?
- Given the proposed role of NETs in climate change modelling, is there a danger of over-reliance on these technologies in net zero strategies?

Yes – it must be emphasized that NETs should be the final piece in the puzzle, not the first. Apart from anything else, they will be more expensive than most options for cutting emissions, and demand will outstrip supply to push up the costs further. Hence, if emissions can be cut economically, this should be the first priority.

- How should the UK Government support the further development of NETs? AND What policy changes, if any, are needed to ensure the UK gains a competitive advantage and remains at the cutting edge of this sector?

1) Invest in R&D to stimulate innovation in UK companies working domestically and internationally. Some of the cheapest NETs options will be in developing countries which could be a win-win for them and the UK.

2) Make CCS or carbon dioxide removal compulsory for fossil fuel companies like Shell and BP to continue extracting the black stuff. This should be a growing percentage of their total production each year on an escalating scale. In this way, they will no longer be able to use the atmosphere as an open sewer for their waste products and they will be incentivized to invest some of their profits into developing technologies to clean up their mess.

- 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 strategy should look not just at the UK but also opportunities for UK companies to use NETs in developing countries, working hand-in-hand with farmers for mutual benefit.

This could be a massive opportunity for developing countries. I would like to see BEIS speaking much more with FCDO and DEFRA on this. It seems like the budget for NETs has been given to BEIS and they are holding onto it rather than thinking holistically of what’s best for the nation and the world. The calls for carbon dioxide removal or biomass

production has all been totally UK focused and allergic to involvement from overseas partners. Yet in BECCS at least, the lowest cost feedstocks will mostly come from developing countries. Why focus on squeezing out extra biomass production in the UK at high cost (e.g. straw costs £100/tonne), when 300 million tonnes of rice straw are burned in Asian paddy fields each year for disposal?! Not only is this resource free, it's actually costing vast amounts of money to get rid of it. The health impacts of straw burning in N. India alone has been calculated at \$30 billion per year. Developing a way to collect this cheaply and use it for BECCS could be transformational, not just to give the UK lower cost carbon removals, but to give developing countries a share of the benefit in fixing our climate. As it is, UKAID budgets have been slashed, there's little incentive for developing countries to participate at COP26 in Glasgow because they see it all as a cost to them, and the UK is pulling up the drawbridge and focusing only on developing NETs in its own back yard. This doesn't make sense and needs to change. The UK has had excellent joined-up thinking before, with ODA funding joining with climate funding, science funding and support for UK SMEs via Innovate UK competitions. It's almost as if government departments spoke to each other! These programmes were the envy of the world. Funding like that, with multiple benefits, gives the maximum benefit for taxpayers' money and my wish is that it should be increased now, not decreased. This holistic approach, including international development benefits, should not just be included in the Biomass Strategy, 2022, it should be a central pillar of it.

Declaration of interest:

For three years, I led an international team of scientists looking at the problem of rice straw burning in Asia and assessing its potential for bioenergy. My teams were from the International Rice Research Institute (Philippines) and Supergen Bioenergy Hub (UK) and the funding was from the UK Government.

Directly after that, I started my own company – Straw Innovations Ltd – and led new British consortia for 4 years – with UK Government co-funding – to set up a pilot plant in the Philippines, collecting waste rice straw more efficiently and using it to produce clean fuel. As we were getting ready to scale it up for commercialisation across Asia, I put in one final proposal to Innovate UK, which scored very highly (82%), yet didn't receive funding because of ODA cuts. So a British company that is pioneering new technologies and business models internationally is now struggling to get over the final hurdle. Having had £millions of taxpayer funds invested to help get us to this point, how is it sensible to cut support now, just as we're at the end of the runway and ready for take-off? I know others in a similar position. Meanwhile, BEIS is getting fresh funding and starting new things off in the UK, trying to produce more biomass and capture carbon from it (at a much higher cost) and we're excluded from applying because although Straw Innovations is a UK company, our operations are in SE Asia. It doesn't seem joined up to me, which is why I'm submitting this evidence to the committee.

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