

Written evidence submitted by Dr Claire Holland, The University of Manchester

Introduction

1. This submission of evidence contributes to the inquiry by the Environmental Audit Committee into Technological Innovations and Climate Change: Negative Emissions Technologies
2. I am a Research Associate at the Manchester Institute of Innovation Research at Alliance Manchester Business School, in The University of Manchester's Responsible Research and Innovation Group working with the Manchester Synthetic Biology Research Centre. I have previously held postdoctoral positions at the Universities of Manchester and Copenhagen, and a Research Fellowship at the University of Reading, predominately investigating the potential for plant cell wall carbohydrates and enzymes to address real-world issues, such as food sustainability, and next-generation biomaterials and biofuels, in a sustainable and environmentally benign way.
3. My current research focusses on the development of a regional roadmap for bio-industrial revolution that encompasses the entire supply and knowledge chain including engagement with large and small-to-mid-size manufacturing enterprises (SMEs), science parks, universities, and biorefineries in the region. Whilst North West specific, if implemented, the roadmap could be altered and applied to other UK regions.
4. I declare that I receive no financial benefits from any beneficiaries or stakeholders in preparing this written evidence.

The Government has indicated it will publish a Biomass Strategy in 2022, including the role of BECCS. What should be included in this strategy?

5. While negative emissions technologies can be considered useful as an immediate solution to facilitate the transition to a bio-based economy, by providing a circuit-break from increasing emissions in the short-term, they should not be considered the "holy grail" of climate modulating technologies. The promise of negative carbon solutions can provide a false sense of security about the technological capacity of the future, which could hinder practical and tangible solutions to immediate problems.
6. While negative carbon solutions are able to actively remove carbon from the atmosphere, at current levels, there is a risk that their widespread use will discourage the behavioural and industrial transitions to lower carbon-solutions and bio-based productions that is needed to afford real and significant long-term and sustainable change.
7. I am answering and giving evidence on the question above with specific reference to my research, which outlines a North West bio-industrial roadmap¹. Whilst I acknowledge that a national strategy is needed, region specific approaches should be part of any national Biomass Strategy. A regional roadmap would offer a model that can be adapted to other regions and the wider UK context.

8. Meaningful “greening” of the UK’s economic recovery requires a significant change in both behaviour and production patterns. The adoption of circular bioeconomy models – involving sharing, leasing, reusing, repairing, refurbishing and recycling² – is one way we could reduce carbon emissions whilst bolstering economic growth.
9. This can be achieved through the use of interlinked biorefineries. Biorefineries are facilities that, typically, process a specific biomass feedstock and convert it into either energy or higher value products^{3,4}. Integration of numerous biorefineries would allow both the utilisation of multiple feedstocks, but also a cascading approach to biomass processing, whereby biomass is fed into the system and is first used to generate the bio-product with the highest societal and economic value. By-products and waste streams of this process can then be utilised downstream to generate alternate, lower value bio-products⁵.
10. The North West has a broad availability of bio-based feedstocks. The UK produces over 16 million tonnes of biomass waste per annum⁶, but biomass type and composition varies significantly between regions. The NW covers a large geographical area, with a diverse biomass supply. This ensures both year-round availability of resources, and opportunities for development of a multi-dimensional, multi-feedstock, bio-based local economy.
11. For example, lignocellulosic biomass (which is of interest for products from biofuels to biomaterials to production of phenolics and other specialty chemicals) could be obtained in the NW from agricultural and forestry waste, green municipal waste, and paper waste, drawing on both the rural areas of the NW like Lancashire and Cumbria, and the large metropolitan areas of Manchester and Liverpool. First-generation crops and food-feedstocks are unsuitable for large scale production of bioproducts as: (1) they typically require good agricultural land and fertile soils, which is limited^{7,8}, and (2) competition for use can contribute to food scarcity, and inflated food and animal feed prices⁹. Despite concerns about food security, the Waste Resource Action Programme (WRAP) estimates ~ 3.6 million tonnes of surplus food and food waste is generated annually on UK farms alone, equating to around 7.2% of total UK food production, with an economic value in the region of £1.2 billion. This could be used as a source of lignocellulose¹⁰.
12. A roadmap should include 1) engagement with regional partners 2) an assessment of region-specific capacity for biomass resources 3) acceleration of business support measures to facilitate a regional pivot to bio-manufacturing and 4) decentralisation of biorefineries
13. For the reasons outlined above, the Government should include a specific, regional and targeted road map for the North West in its 2022 Biomass Strategy.

Actions that the Government should take

14. **The Government’s plans for its 2022 Biomass Strategy must include specific regional strategies. The Government should engage the Department for Levelling Up, Housing and Communities and the Department for Business, Energy and Strategy in this strategy, but crucially the government should seek active engagement with regional leaders, organisations and industry to inform its roadmap (more in point 17).**

15. **The Government should prioritise technologies and feedstocks that can be optimally integrated within a region's specific industrial and environmental landscape. This requires considerations of specific bio-technology effectiveness.**
16. **New initiatives to build a regional bioeconomy could be accelerated through the development of public bio-foundries (to support SME bio-manufacturing transition) and decentralised biorefineries (to expand regional capacities).**
17. **The Government should seek active engagement with both large and small and medium-sized manufacturing enterprises, science parks (such as Alderley Park, Liverpool Science Park, and Citylabs), universities, the Manchester-based Future Biomanufacturing Research Hub, and biorefineries (e.g., Liverpool's MicroBioRefinery). The NW strategy should be led by regional focus engagement organisations, such as the N8 Research Partnership, the Northern Powerhouse Partnership, or via a new collaborative effort between the major metropolitan organisations of the NW.**

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References

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