

Greenhouse Gas Removal Technologies study: Call for evidence

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Ember's response

On the Evaluation of GGR Technologies

2. *What are the constraints (beyond funding) to the potential size of a UK-based GGR industry? At what point do these constraints come into effect and impact the development of adequate capacity to meet the net zero ambition? Constraints could include requirements for inputs, e.g. sustainable biomass, and infrastructure and accounting requirements.*

The ability of BECCS to deliver negative emissions is founded on the assumption that burning biomass to generate energy is carbon neutral: if burning biomass is carbon neutral then capturing its emissions results in negative emissions. Therefore, combining CCS technology with existing bioenergy technology provides a deployable negative emissions mechanism that can scale. The perceived availability and deliverability of BECCS as a result of these assumptions has led to the prominence of BECCS in negative emissions scenarios.

However, a growing weight of evidence has overturned the assumption of the carbon neutral status of biomass: The European Academies Sciences Advisory Council (EASAC) now states that using woody biomass for power *"is not effective in mitigating climate change and may even increase the risk of dangerous climate change."*¹ On the balance of the evidence, there is a high risk that current practices of burning biomass to generate energy is net carbon emitting and contributing to climate change over a timescale relevant to the Paris Agreement. Therefore, understanding the full emissions embodied in biomass is essential for calculating the genuine negative emissions delivered and as a result, the potential size of the contribution BECCS can make to the UK-based GGR industry.

¹ EASAC (2021) *Climate impact of woody biomass*,
<https://easac.eu/media-room/press-releases/details/easac-welcomes-that-the-jrc-report-strengthens-the-case-for-shorter-payback-periods-on-woody-biomass/>

On Market mechanisms and policy frameworks

5. Are there existing policies that will need to be adjusted to enable the development and deployment of the different GGR technologies?

The primary source of biomass used in large-scale bioenergy is wood derived from the forestry sector. The carbon impacts of burning wood for energy are dependent on many variables regarding the type of wood used, the impacts on forest carbon sinks of harvesting wood for biomass, and comparisons of biomass use against counterfactual situations in which biomass is not burned. In theory, burning wood can be considered carbon neutral provided that it satisfies specific cases of the above variables in which forestry products are maximised for higher carbon-saving non-energy uses, and harvesting wood for biomass results in improvements in forestry management and increases carbon stocks. However, these scenarios rely on strong policy measures to incentivise only the production and consumption of wood that delivers carbon savings, and robust verification that such policies are always being followed² - even small amounts of higher-carbon feedstock in the supply chain can lead to biomass emissions which are higher than coal. Such policy measures do not exist in the UK.

Given the complexity of establishing the carbon impacts of burning wood, it is unclear what the scale of supply of genuinely carbon neutral wood is and so it is very difficult to establish a realistic magnitude of negative emissions that can be delivered through BECCS.

As an alternative (or in addition) to the use of wood as a feedstock for BECCS, the production of dedicated energy crops has also been suggested. Indeed the CCC have presented scenarios in which, to meet demand, 1Mha of UK land is made available for energy crop production and in extremis increased global production of energy crops requires 200Mha - an area the size of Greenland. As we have stated previously in our report on National Grid's 2020 Future Energy Scenarios³, although it is technically possible to achieve these various supply scenarios, given the enormous scale of land they require for energy crop production, there are very significant implications around food competition, water consumption, pesticide use, and biodiversity impacts.

To achieve a genuinely sustainable supply of biomass, all of the above considerations need to be addressed and satisfied – a task that would require significant research into and monitoring of best-practice in biomass consumption, as well as comprehensive multilateral policy and legislation to ensure its enforcement.

Other uses of land for generating negative emissions must be considered. Once the carbon costs of pesticide and fertiliser use, as well as those of harvesting and transportation have been factored in, the realised negative emissions of bioenergy crops in BECCS may be lower than if the same land was used for another carbon-absorbing activity such as planting natural forests, especially across the short time between now and 2050.

² Robert Matthews, Geoff Hogan and Ewan Mackie (2018) *Carbon impacts of biomass consumed in the EU: Supplementary analysis and interpretation for the European Climate Foundation*, Project report for ECF

³ Ember (2020) *Gambling with biomass: Reliance on BECCS undermines National Grid's net-zero scenarios*, <https://ember-climate.org/commentary/2020/10/28/gambling-with-biomass/>

In addition to the serious risks of failing to deliver negative emissions, large-scale deployment of BECCS will also likely be a highly expensive process. As we have recently reported⁴, Drax, the world's largest biomass user, received £832m in public subsidy in 2020. Delivery of large-scale negative emissions through BECCS will require bioenergy capacity far greater than that of Drax and so accordingly will involve very large costs to the public purse⁵.

Use of public funds to subsidise bioenergy currently represents a poor use of this money when compared to cheaper and genuinely emissions-free sources of energy (such as wind and solar). Supporting BECCS with public money must be approached cautiously, and the economics carefully compared with other proven GGR methods such as the restoration or planting of forests. It is also worth considering the impact that investing the money required for BECCS in more rapid and deeper societal decarbonisation could have in actually reducing the need for GGR.

⁴ Ember (2021) *Briefing: Drax's 2020 biomass subsidies*,
<https://ember-climate.org/commentary/2021/02/25/drax-biomass-subsidies/>

⁵ See also: Ember (2020) *The Burning Question: Should the UK end tax breaks on burning wood for power?*,
<https://ember-climate.org/project/the-burning-question/>