BIOCHAR BRIEF 2

Stakeholder Visions for Biochar in UK Agriculture: Implications for Governance

1. About (this) Biochar Brief

Biochar Briefs are a series of short documents produced by the social sciences team on the UKRI funded Biochar Demonstrator programme (2021-2026). The series aims to present aspects of the social science research in an accessible form for a variety of audiences interested in biochar production, utilisation / deployment, governance, and science.

Biochar is increasingly discussed as one of several land-based options that could contribute to the UK's greenhouse gas removal (GGR) ambitions. Its appeal in this context stems from the ability of some biochars[1] to store carbon in a relatively stable form, offering a removal pathway that is both measurable and potentially long-lasting.

Biochar Brief 2 focuses on biochar and UK agriculture. Farmland is commonly positioned, sometimes taken for granted, as the place where biochar is most likely to be used, even though agriculture is only one of several potential pathways for biochar application or use, alongside land remediation, construction materials, and horticulture.

Existing land-management systems and practices create a sense of compatibility: biochar seems to fit within familiar routines of farming and there is some evidence that it has various agricultural co-benefits. This may help to explain the often-observed assumption that farmland is the most suitable and practical place for biochar even though this largely ignores the priorities and risk assessments of farmers as key stakeholders.



Close up of a wood-based biochar

[1] See Biochar Brief 1: 'We Need to Talk About Biochars, Not Biochar'.

This Biochar Brief seeks to examine the assumptions about biochar's role in agriculture by presenting stakeholder perspectives and considering how these are shaping the opportunities and tensions emerging around biochars' development.

Throughout this Biochar Brief we use both 'biochar' and 'biochars', recognising the tension between the usefulness of a common category and the diversity of materials that sit within it[2]. We use 'biochar' when discussing the category more generally and 'biochars' where those differences are important.

2. Evidence Base

Underpinning this document is a substantial body of qualitative social science research conducted as part of the Biochar Demonstrator project. Evidence was gathered using several methods from across the UK's agricultural and biochar sectors, as well as the wider set of organisations engaged with biochar. 58 in-depth interviews were conducted with farmers, industry actors, scientists, carbon market intermediaries, environmental advocacy groups, and national and local government officials. Farmers represented a particularly diverse group, reflecting different farm systems, farm size, and levels of experience with biochar — from those experimenting with on-farm pyrolysis[3] to those using purchased biochar or considering future deployment. The Biochar Brief includes direct quotations from the interviews conducted with stakeholders. Additional insights were drawn from publicly available materials produced by organisations engaging with biochar.

This broad evidence base provides insight into the institutional trajectories shaping biochar and the practical realities and priorities of those engaging with biochar on the ground. More specifically, it has revealed two distinct ways of imagining biochar's future in UK agriculture[4]. These are not simply different technical options; they are coherent visions of what biochar is for, how it should be produced, and what kind of agricultural future it belongs to. Each vision carries its own assumptions about scale, value, responsibility, and legitimacy. Understanding these visions is essential for shaping a credible and legitimate future for biochar, as well as for designing effective biochar governance in the UK.

The visions presented below reflect stakeholders' perspectives and understandings expressed through the research. They capture how participants imagined possible futures for biochar in UK agriculture but may not encompass the full technical detail of the issues discussed.

3. Vision A: Biochar as a Large-Scale Carbon Removal Technology Deployed Through Agriculture

One vision positions biochar primarily as a greenhouse gas removal technology. In this view, its value lies in its ability to store carbon for long periods, and its future is imagined through

[2] For a fuller discussion of the distinction between 'biochar' and 'biochars', see Biochar Brief 1: 'We Need to Talk About Biochars, Not Biochar'.

[3] Pyrolysis means heating organic material, such as wood or crop residues, with little or no oxygen to produce biochar. Some farmers have their own pyrolysis equipment and produce biochar on their farm.

[4] This Biochar Brief draws on the research published in Price C and Morris C (2026) Contesting land-based greenhouse gas removal futures: Emerging sociotechnical visions of biochar in UK agriculture. Agriculture and Human Values 43(168) https://doi.org/10.1007/s10460-026-10984-5.

the lens of national net zero commitments. This vision is shaped by wider governance priorities: the emphasis on permanence, verification, and carbon markets creates expectations that biochar should be produced in ways that are standardised, measurable, and scalable.

How this vision imagines biochar production
Biochar is produced at industrial scale, typically off-farm, using large pyrolysis units capable of processing significant volumes of biomass. These facilities are seen as part of a growing carbon removal industry, supplying biochar to farms as a product rather than a process integrated into farm systems. The model assumes economies of scale, centralised expertise, and a clear separation between production and application.

How this vision imagines farmers
Farmers are positioned primarily as end-users. Their role is to apply biochar to land, enabling farmland to function as a long-term carbon storage site. The assumption is that if the agricultural co-benefits of biochar are clear and the product is safe, farmers will be willing to buy and apply it.



Biochar being spread on a stubble field

Why this vision appeals
This model offers clarity and simplicity. It aligns with emerging carbon markets, and the methodologies being developed for biochar. It also offers a route to integrating biochar into national climate strategies with measurable outcomes.



"I think biochar is the most secure and durable form of carbon storage because you can literally pick it up and hold it. … I can produce a ton of biochar today and you can hold that carbon and it's there and we're all very happy and we know it exists. So, I think it will provide the foundations for a movement towards carbon trading which is far more secure and trusted" (commercial biochar producer).

Where tensions emerge
Farmers raise consistent concerns that challenge the assumptions of this vision:

- **Economic viability**: purchasing and applying externally produced biochar is costly, and agronomic benefits remain uncertain.
- **Distribution of benefits**: carbon credits typically accrue to the biochar producer, not the farmer who applies the biochar.
- **Risk**: concerns about contaminated feedstocks, nutrient lock-up, and the environmental impacts of transporting biomass.
- **Alignment with farm priorities**: soil health, biodiversity, and practical management often matter more to farmers than carbon storage.

These concerns highlight a legitimacy gap. While the carbon-centric vision aligns with national climate objectives, it does not necessarily align with farmers' priorities, experiences, or risk assessments.



"[farmers]… are quite short-term thinking and they won't be incentivised to pay for biochar to apply to their land unless they see an immediate impact on yields which it is unlikely to do" (livestock farmer, England, using biochar [purchased or given to them]).

4. Vision B: Biochar as a Multifunctional On-Farm Resource
A second vision imagines biochar as a locally produced, multifunctional agricultural resource. In this view, biochar is not primarily a carbon removal technology but a tool that supports soil health, biodiversity, and farm business resilience. This vision is grounded in farmers' lived experience of managing land, dealing with uncertainty, and adapting to environmental and economic pressures.

How this vision imagines production
Biochar is produced locally — often on-farm or by non-farm biochar manufacturers — using farm biomass such as prunings, hedge trimmings, or farm residues. Pyrolysis is seen as a potential extension of existing farm activities, not a separate industrial process. Some farmers imagine cooperative models, shared equipment, or local hubs that keep value within rural communities.

How this vision imagines farmers
Farmers are central actors: producers, experimenters, innovators, and interpreters of what biochar can do. Their knowledge of soils, crops, and local ecosystems shapes how biochar is used and what benefits are prioritised. This vision values flexibility and adaptation rather than standardisation.

What motivates this vision
Farmers describe a wide range of potential benefits from biochar use: improved soil structure and water retention, increased crop resilience, and opportunities to use on-farm biomass more effectively. Some see potential new income streams from selling biochar or feedstocks. A further dimension emphasises biodiversity, with farmers linking biochar to hedgerow and woodland management, wildlife corridors, and soil food webs.

"If I knew it [biochar] was going to improve the health of my soil over a period, I would be more interested than if someone said it is going to lock up lots of carbon" (livestock farmer, England, not yet used biochar but interested).



Biochar in a stubble field

Where tensions emerge

This vision is not without uncertainties. Farmers want clearer information about agronomic benefits, ethical concerns about carbon markets persist, and regulatory uncertainty creates hesitation. Yet these concerns do not undermine the vision; they highlight the need for governance that supports experimentation and recognises diverse forms of value.

"I'm not sure I would trade [carbon] with, say, Virgin Airlines, and this is just using them as an example. They need to clean their own act up" (arable farmer, England, trial farm).

5. Implications for Biochar Governance

The existence of two competing visions of biochar's role in agriculture has implications for the governance of this emerging technology. These implications do not point toward a single preferred pathway. Instead, they highlight the importance of keeping multiple pathways open and avoiding premature closure around any one model.

Governance must remain open to plurality
The diversity of visions suggests that biochar cannot be governed through a single, uniform model. Industrial, carbon-centric approaches and localised, multifunctional approaches are developing in parallel. Governance frameworks that assume only one of these pathways will struggle to gain legitimacy among key stakeholders.

Farmer participation is essential
Farmers are not passive adopters of biochar. They are active experimenters, producers, and interpreters of what biochar can and should be. Their concerns about cost, risk, contamination, and the distribution of benefits highlight the importance of governance arrangements that are credible, transparent, and attentive to on-farm realities.

Carbon-centric framings risk narrowing the agenda for biochar's use in agriculture
A narrow focus on carbon removal risks overlooking the wider set of benefits that many farmers associate with biochar, including soil health, biodiversity, and business diversification. Policies that focus exclusively on carbon may therefore fail to resonate with the motivations and priorities of agricultural stakeholders.

Market-based models require careful handling
Industrial and market-driven models are already shaping expectations, particularly through the net zero agenda and the growing prominence of carbon markets. At the same time, farmers express scepticism about the fairness and transparency of these markets. Policymakers will need to navigate these tensions carefully[5].

Flexibility and adaptability are key
Given the emergent nature of biochar and the diversity of visions surrounding it, governance approaches that are flexible, adaptive, and capable of evolving alongside the technology are likely to be more effective than rigid, prescriptive frameworks.



Biochar being loaded before being spread on a stubble field

[5] For a fuller discussion, see Biochar Brief 3: Biochar Carbon Markets: Stakeholder Perspectives and Governance Implications.

6. Conclusion

Biochar's future in UK agriculture is not predetermined. It will be shaped by the interplay of national climate ambitions, scientific expectations, commercial interests, and farmers' lived experiences. Policymakers have a critical role in ensuring that governance frameworks are inclusive, legitimate, and aligned with the diverse priorities of those who manage the land.

Recognising and supporting multiple visions — rather than forcing convergence around a single model — offers the most promising route to a just, achievable, and transformative role for biochar in UK agriculture.

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