BIOCHAR BRIEF 3

Biochar Carbon Markets: Stakeholder Perspectives and Governance Implications

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 3 focuses on carbon markets—particularly voluntary carbon markets (VCMs)—as these have emerged as a prominent governance mechanism for incentivising biochar production and use. Agricultural land is commonly assumed to be the primary site where biochar will be applied and stored[2], an assumption that shapes how carbon markets are being developed around it. Because of this, farmers are implicitly positioned as key participants in biochar deployment.

We observe a tendency to take for granted that carbon markets are the most appropriate and effective governance pathway to scale biochar. This is the case even though the governance of emerging GGR technologies through market mechanisms is contested and socially consequential[3]. Attention has grown around methodologies, permanence standards, and the commercial value of biochar carbon credits. Far less consideration has been given to how different stakeholders across the biochar and agricultural sectors perceive and understand biochar carbon markets, how they make sense of the distribution of benefits and risks, and how biochar carbon market-led expectations intersect with the lived experiences and priorities of farmers.

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[4]. We use 'biochar' when discussing the category more generally and 'biochars' where those differences are important.

[1] See Biochar Brief 1: 'We need to talk about biochars, not biochar'.

[2] See Biochar Brief 2: Stakeholder Visions for Biochar in UK Agriculture: Implications for Governance.

[3] Price C, Morris J, and Morris C (2024) Biochar carbon markets: A mitigation deterrence threat. Environmental Science & Policy 154 https://doi.org/10.1016/j.envsci.2024.103704.

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

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[5] 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 both the institutional trajectories shaping biochar carbon markets and the on-farm realities that influence how these markets are engaged with. It also highlights the diversity of perspectives about the strengths and weaknesses of carbon markets as a governance pathway for biochar as a GGR technology.



Close up of a wood-based biochar

3. Why Voluntary Carbon Markets Have Become Central to Biochar Governance

The prominence of voluntary carbon markets in biochar governance has been shaped by scientific, industry, and media narratives that frame market mechanisms as the most viable route to scaling biochar. Early scientific work positioned biochar as a high potential carbon storage option and identified carbon trading as the mechanism through which this potential could be realised[6]. Industry organisations have reinforced this framing by promoting biochar as a high-quality carbon removal option and highlighting the credibility of the credits

[5] 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.

[6] Lehmann J, Gaunt J, and Rondon M (2006) Bio-Char sequestration in terrestrial ecosystems - a review. Mitigation and Adaptation Strategies for Global Change 11(2): 403–427 https://doi.org/10.1007/s11027-005-9006-5.

generated from it, credibility underpinned by emerging methodologies and growing corporate demand[7].

Media coverage, though limited, tends to echo these narratives, presenting carbon credits as essential to the growth of the biochar industry and emphasising the role of market incentives in enabling scaling[8] [9]. These narratives collectively create an expectation that carbon markets are the natural governance pathway for biochar, even though this assumption has not been widely debated among those who will be most affected by it.

Expectations are also growing that biochar could eventually be incorporated into compliance carbon markets (CCMs), contributing to the sense that market-based governance is becoming the default pathway. However, stakeholder perspectives reveal a far more varied and complex picture than this narrative suggests.

4. Stakeholder Perspectives on Biochar Carbon Markets

Three themes consistently emerged in how stakeholders understand and evaluate biochar carbon markets. These themes reveal both the opportunities and tensions associated with market-based governance and highlight the need for careful consideration of how benefits and responsibilities are distributed. The themes presented below reflect stakeholders' perspectives and understandings as expressed through the research. They capture how participants made sense of biochar carbon markets and may not encompass the full technical detail of every issue discussed.



Biochar being spread in a stubble field

[7] Price C, Morris J, and Morris C (2024) Biochar carbon markets: A mitigation deterrence threat. Environmental Science & Policy 154 https://doi.org/10.1016/j.envsci.2024.103704.

[8] Nerlich B, Morris C, Price C, and Harris H (2024) Biochar in the British print news media: an analysis of promissory discourse and the creation of expectations about carbon removal. Science as Culture 33(3): 392–416. https://doi.org/10.1080/09505431.2023.2285057

[9] Morris C, Price C, and Nerlich B (2024). Biochar in the UK Print News Media: Issue Frames and Their Implications for Opening up Debate About Land-based Greenhouse Gas Removal. Environmental Communication 18(8): 1168–1185. https://doi.org/10.1080/17524032.2024.2357318.

Carbon Markets Offer Clear Financial Benefits for Some
Stakeholders recognised growing corporate interest in purchasing biochar carbon credits, driven by the search for long-lasting carbon removals. Biochar carbon credits currently command significantly higher prices than many other carbon credit types, reflecting their perceived permanence. For farmers who produce biochar on-farm and own the associated pyrolysis equipment, carbon markets can provide substantial new income streams. Some stakeholders described earning tens of thousands of pounds annually from carbon credit sales, while others had made significant capital investments in pyrolysis units on the expectation of future revenue.

These experiences illustrate that biochar carbon markets can create meaningful financial opportunities for some stakeholders—particularly those able to produce biochar at scale and retain ownership of the carbon credits. However, these benefits are not evenly distributed across the agricultural sector.



"Biochar certificates are going for £200, £300 a tonne in comparison to afforestation credits which are going for like £20 or £30 a tonne. The difference between the two is that afforestation is both much less permanent and takes a lot longer than biochar" (livestock farmer, England, using biochar [purchased or given to them]).

Conditional Support: Concerns About Fairness, Functionality, and Distribution of Benefits
Many stakeholders expressed cautious or conditional support for carbon markets. Their concerns centred on the volatility of biochar carbon markets, the proliferation of methodologies, and the absence—until recently—of agreed permanence and MRV standards. These issues were seen as barriers to trust and long-term planning.

A recurring concern related to the distribution of benefits between biochar producers and farmers who apply biochar to land. When farmers purchase biochar from off-farm producers, the associated carbon credits remain with the producer. Farmers deploying biochar receive none of the carbon credits, despite being central to the pathway through which biochar is imagined to scale. This dynamic raises concerns about distributive injustice, where off-farm producers capture the financial benefits while farmers bear the costs and uncertainties.

Some stakeholders also questioned whether selling farm-generated biochar carbon credits to other industries undermines agriculture's own decarbonisation goals. Several argued that carbon credits should remain within the agri-food supply chain to support sector wide net zero commitments.



"The only time they [a farmer] will be able to claim for carbon sequestration is if they own the pyrolysis unit. If they're purchasing biochar from somewhere else... they'll [carbon credits] be sold to somebody else" (livestock farmer, England, using biochar [purchased or given to them]).

Fundamental Ethical Objections to Carbon Markets
Some stakeholders expressed principled objections to carbon markets as a governance mechanism. Their concerns included scepticism about the robustness and integrity of carbon markets, discomfort with the commodification of carbon, and the belief that offsetting enables high emitting industries to continue "business as usual". Some expressed a preference for carbon taxation or direct regulation over market-based approaches.

These objections are not rooted in misunderstandings of carbon markets but in considered ethical and ideological positions. They point to a fundamental misalignment between carbon market centred governance and the values held by some farmers.



"I'm not a great fan of carbon trading full stop. I have a hesitation about anything to do with carbon trading because I don't think it addresses the issues. It creates a market out of something that should not really be a market. I'd be much more comfortable if we had an international agreement on taxation of [fossil fuel] extraction than on carbon trading" (Farmer Focused – Representation/Advocacy stakeholder).

5. Implications for Biochar Governance
The diversity of stakeholder perspectives has important implications for the governance of biochar in the UK. These implications extend beyond agricultural practice to encompass the beliefs and motivations of farmers, the practical realities of deploying biochar, and the structure of carbon markets in which biochar carbon credit ownership typically sits with producers rather than with the farmers or other land managers applying the biochar[10]. At the same time, approaches to ensuring the integrity of biochar carbon markets continue to develop within the wider governance landscape[11].

Carbon Markets Should not be Assumed as the Default Governance Mechanism
While carbon markets offer clear benefits for some actors, they also raise concerns about fairness, legitimacy, and alignment with agricultural priorities. Actors involved in shaping biochar governance should avoid assuming that VCMs or CCMs are the natural or inevitable governance mechanism for biochar.

Distributional Impacts Require Careful Attention
The potential for distributive injustice—where benefits accrue to off-farm producers while farmers bear costs—requires explicit consideration. Governance frameworks must address questions of ownership, value, and responsibility if they are to gain legitimacy among agricultural stakeholders.

Alternative Governance Mechanisms Should Be Explored
Stakeholders frequently identified government incentives—particularly within post-Brexit agricultural policy—as a more legitimate and equitable route to supporting biochar

[10] See Biochar Brief 2: Stakeholder Visions for Biochar in UK Agriculture: Implications for Governance.
[11] For a fuller discussion see Thoppil M, Martirosian N, Morris C, Mouchos E, Price C, Snape C, Brazzola N, Mercer L, and House J (2026) Biochar Carbon Removal Standards: Comparative Assessment of the EU CRCF, ICVCM and Article 6.4. https://doi.org/10.71706/d0ebc5c4-07d4-4d8f-a00d-26f7b3eafe00

deployment. Integrating biochar into Environmental Land Management schemes (ELMs) or devolved equivalents could provide a credible alternative to market-based incentives.

Ethical Concerns Must Be Taken Seriously
Principled objections to carbon markets cannot be resolved through technical fixes alone. Governance arrangements must recognise and engage with these concerns if they are to secure broad participation and trust.

Governance Must Anticipate the Risks of Market-Led Pathways
Relying on carbon markets to govern biochar introduces specific risks that stakeholders repeatedly identified. These include uneven access to market opportunities, the potential for benefits to accrue to a narrow set of actors, and the possibility that market incentives could overshadow wider considerations about how and why biochar is used. Several stakeholders also questioned whether carbon markets can provide the transparency and accountability needed for an emerging GGR technology. Effective governance will need to anticipate these risks and ensure that market-led pathways do not become the default simply because they are already in motion.



Biochar in a stubble field

6. Conclusion
Biochar carbon markets are emerging at a time when the UK is seeking credible and durable forms of greenhouse gas removal. Yet the perspectives shared by farmers, industry actors, and other stakeholders show that market-based governance introduces its own set of challenges. While biochar carbon markets can create strong incentives for some actors, they also raise questions about how carbon credits are allocated, who is positioned to benefit, and whether market structures can provide the transparency and accountability expected of an emerging GGR technology.

The future governance of biochar will depend on how these issues are addressed. Policymakers will need to consider not only how biochar carbon markets operate, but

whether they can support a fair and trusted approach to biochar deployment. This includes recognising the limits of market-led pathways, the ethical concerns raised by some stakeholders, and the risk that market incentives may shape biochar's development in ways that do not align with wider expectations or responsibilities.

A credible governance pathway for biochar will therefore require more than refining market rules. It will require careful attention to the distribution of benefits, the legitimacy of market participation, and the broader purposes that biochar is expected to serve. By engaging seriously with these questions, the UK can develop governance arrangements that reflect the complexities of carbon market approaches and support biochar's contribution to the net zero transition in a way that is both effective and socially grounded.

Contact details.

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