

The Challenge and Opportunity for the Reduction of Atmospheric Carbon: MRV for Artisanal (or Distributed) Biochar

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ABSTRACT

Biochar is increasingly recognized as a crucial solution to climate change, attracting significant investments from companies like Microsoft, which are purchasing carbon removal credits to offset their emissions. Despite its promise, skepticism remains regarding “artisanal” or distributed biochar produced by countless small farmers.

Keywords: MRV, Methane Emissions, Biochar, Artisanal Biochar, Distributed Biochar, Smallholders

Introduction

Why MRV Matters

Biochar is increasingly recognized as a crucial solution to climate change, attracting significant investments from companies like Microsoft, which are purchasing carbon removal credits to offset their emissions. Despite its promise, skepticism remains regarding “artisanal” or distributed biochar produced by countless small farmers. This skepticism is largely due to concerns about the trustworthiness of smallholder biochar, particularly regarding its carbon-negative claims. Even though making biochar can remove carbon and deadly PM2.5 from the atmosphere by preventing the open burning of crop residues, major buyers are hesitant. They often hesitate to engage with this market because they fear that small producers lack the capacity to demonstrate robust, digital monitoring (hence dMRV), reporting, and verification (MRV) for each batch of biochar they produce. In contrast, industrial producers can meticulously document every aspect of their processes, making it easier for them to gain market acceptance.

The Problem: Methane Emissions and Verification

Pyrolysis, which is used to create biochar, naturally emits methane (CH₄), a greenhouse gas that is over 80 times more potent than CO₂ over a 20-year period. While industrial machinery can measure methane emissions in real time, smallholders typically use basic tools and cannot afford to track emissions for their small batches, which although ultimately amounting to 100s of tonnes may average just 10-12 kilograms each. This lack of measurement capability makes it difficult for buyers to verify the climate benefits of smallholder biochar, leading to hesitation in the market.

Why MRV Is Important for Buyers, but Not Always for Small Producers

MRV provides a trustworthy account of biochar production, including critical factors such as temperature, burn duration, and emissions. This transparency reassures buyers that the biochar meets their standards, which is especially important for large buyers who are held accountable for their climate commitments. However, for small producers, comprehensive record-keeping is often impractical and unnecessary. Many smallholders use simple methods and locally available crop residues to produce consistent, beneficial biochar that reliably improves soil fertility and structure. (Industrial machinery, for example, can measure

methane emissions for large amounts of char in real time, but smallholders, using basic tools, cannot afford to track emissions for their small batches (which may ultimately amount to hundreds of tonnes but may average just 10-12 kgs each).

(Industrial fears that smallholder biochar generates significant emissions are often unfounded. Research indicates that using dry feedstock, even with the simplest pit methods, results in minimal greenhouse gas emissions. Numerous studies confirm that even when primitive techniques are employed demonstrating that artisanal biochar can be a viable climate solution, provided that the right systems are in place to support its production and verification.)

Where MRV Is Essential

For industrial-scale production, MRV is vital to maintain quality and prevent fraud. Errors or intentional misreporting can compromise thousands of tonnes of biochar, undermining the integrity of carbon markets. For smallholders, however, the practicality of MRV is less certain given their limited resources and the small scale of production. This disparity raises questions about how to create a fair and effective MRV system that accommodates the realities of artisanal biochar production.

Concerns About Artisanal Biochar

Despite its potential, artisanal biochar faces skepticism from buyers who worry about its quality. Past failures in carbon credit markets, where some offset projects proved ineffective, have left a lingering distrust. To rebuild this trust, credible, ongoing monitoring and verification are crucial. However, current standards often prioritize industrial production, overlooking the unique challenges and realities faced by small-scale producers.

Developing Credible MRV for Artisanal Biochar

The solution lies in developing MRV systems that are both scientifically sound and practical for small-scale producers. The CSI Global Artisan Standard is one example of an initiative that employs science-based protocols designed for low-tech environments. This approach includes:

- Using photos with GPS and timestamps to record production activities and feedstock sources.
- Mandating and verifying the use of dry feedstock to reduce emissions
- Simple, affordable tools for measuring temperature, emissions, and product quality to facilitate monitoring without imposing prohibitive costs.

These methods help smallholders achieve MRV compliance while maintaining affordability and accessibility.

Benefits and Challenges

Implementing these standards can build market confidence and open up income opportunities for smallholders. It can also foster knowledge sharing, which can improve biochar quality and climate outcomes within communities. However, challenges persist, including ensuring a steady supply of a common feedstock, having sufficient land to apply biochar, and preventing the proliferation of low-quality credits. The solution lies in disciplined, transparent MRV adapted to artisanal circumstances, rather than a blanket rejection of smallholder biochar.

Conclusion: Defining Success

A successful path forward would involve thousands of smallholders utilizing robust MRV within credible standards, creating dependable carbon removal that benefits both buyers and producers. This would lead to healthier soils, reduced burning of agricultural waste, and greater economic resilience for communities. As standards continue to evolve, they must remain accessible while reflecting advancements in science and technology. Ultimately, the widespread adoption and impact of artisanal biochar depend on MRV systems that are both rigorous and realistic, connecting smallholders to global markets and positioning biochar as a key solution in the fight against climate change.

The challenge of MRV for artisanal biochar is not insurmountable. By developing practical, transparent, and scientifically sound MRV systems, we can unlock the potential of smallholder biochar production, ensuring it plays a vital role in carbon removal and sustainable agriculture. The future of biochar lies in our ability to bridge the gap between small producers and large buyers, fostering a more inclusive and effective approach to climate action.