



GLOBAL BIOCHAR MARKET REPORT



2023



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IBI and USBI also wish to thank the European Biochar Industry Consortium (EBI) for sharing 2023 market data and to ANZBIG and EBI for sharing the market research survey with their stakeholders.

Commonly Used Acronyms in this Report

BCR – biochar carbon removal

CAGR – compound annual growth rate

CDR – carbon dioxide removal

GHG – greenhouse gas

IBI – International Biochar Initiative

MRV – measurement, reporting, and verification

mt – metric tonnes

USBI – US Biochar Initiative

VCM – voluntary carbon market

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Letter from IBI & USBI

On behalf of the International Biochar Initiative (IBI) and the US Biochar Initiative (USBI), we are pleased to share the 2023 Global Biochar Market Report, the first biochar industry-led global report since 2015, complimenting annual market reports from the European Biochar Industry Consortium (EBI).

IBI and USBI targeted this survey toward a global community of organizations and companies across the biochar industry value chain, from feedstock providers to producers to end users.

IBI and USBI focus on promoting the sustainable production and use of biochar in communities around the world and, for USBI, in North America. Alongside colleagues at EBI, the Australian and New Zealand Biochar Industry Group, the Instituto Latinoamericano del Biochar, and the over 20 national biochar organizations, we seek to continue our commitments to further industry research, market development, promotion, and education to keep the industry on its growth trajectory.

A key component of these roles is to promote the scalability of the biochar industry and to gather feedback from the biochar community. As part of this effort, the 2023 Global Biochar Market Report represents the first annual survey with goals of:

- Improving understanding of the biochar industry and its value to better engage with the industry and with policymakers, investors, and observers
- Developing reliable estimates for key industry data
- Generating data and direct feedback for biochar organizations to better serve the industry
- Benchmarking and tracking long-term industry trends
- Creating a feedback mechanism between industry and biochar organizations

This comes at a pivotal time for biochar and biochar carbon removal (BCR). Biochar continues to lead the way in delivering durable carbon dioxide removal

(CDR) credits in the voluntary carbon market (VCM), representing more than 90% of global deliveries in 2023 in the [cdr.fyi database](https://cdr.fyi/database). Based on the results from this survey, we estimate significantly higher global production of at least 350,000 metric tonnes (mt) of biochar annually, representing a potential 600,000 mt or more of CDR in 2023. We also found that biochar production is growing rapidly, with a CAGR of 91% from 2021 to 2023, and to maintain this high growth rate developing high value and large volume end-use markets for biochar is a key priority.

On a broader level, we at IBI and USBI continue to believe in the enormous potential of biochar, as a climate mitigation tool, as a sustainable input to agricultural and industrial supply chains, and as a way to bridge emerging political and ideological divides with solutions. In this time of increasing division between and within countries and regions, a growing biochar industry offers an opportunity to mitigate climate change while also creating economic opportunity in rural agricultural and forestry economies that are frequently left behind as the world modernizes. For these rural economies that frequently view the costs of climate mitigation as too burdensome, biochar production presents an enormous opportunity to turn this burden into an opportunity.

Moving forward, IBI and USBI intend to conduct this research on an annual basis and we hope to increase engagement from more subsectors of the industry and world regions. We received responses from all continents, but did have a slightly higher response rate from North America, which we note in the report, likely resulting from the collaboration between IBI and USBI.

We want to thank the 1,000+ respondents who shared their company market data to help IBI and USBI create a timely and accurate – though of course imperfect – snapshot of the global biochar industry.



Lucia Brusegan
Chair, IBI Board of
Directors



Myles Gray
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Highlights

This 2023 *Global Biochar Market Report* from the International Biochar Initiative (IBI) and the US Biochar Initiative (USBI) is the first broad market survey of the global biochar industry since 2015.

Since the previous global study, biochar has come into its own as a CDR technology, a circular climate change mitigation and adaptation solution, and as an input material for agriculture, the built environment, and soil and water remediation work, among other sectors. This report highlights the growth in the biochar industry, along with priorities, challenges, and insights, gathered during the 2023 survey.

The report is focused on **five key findings** from the 1,000+ respondents:

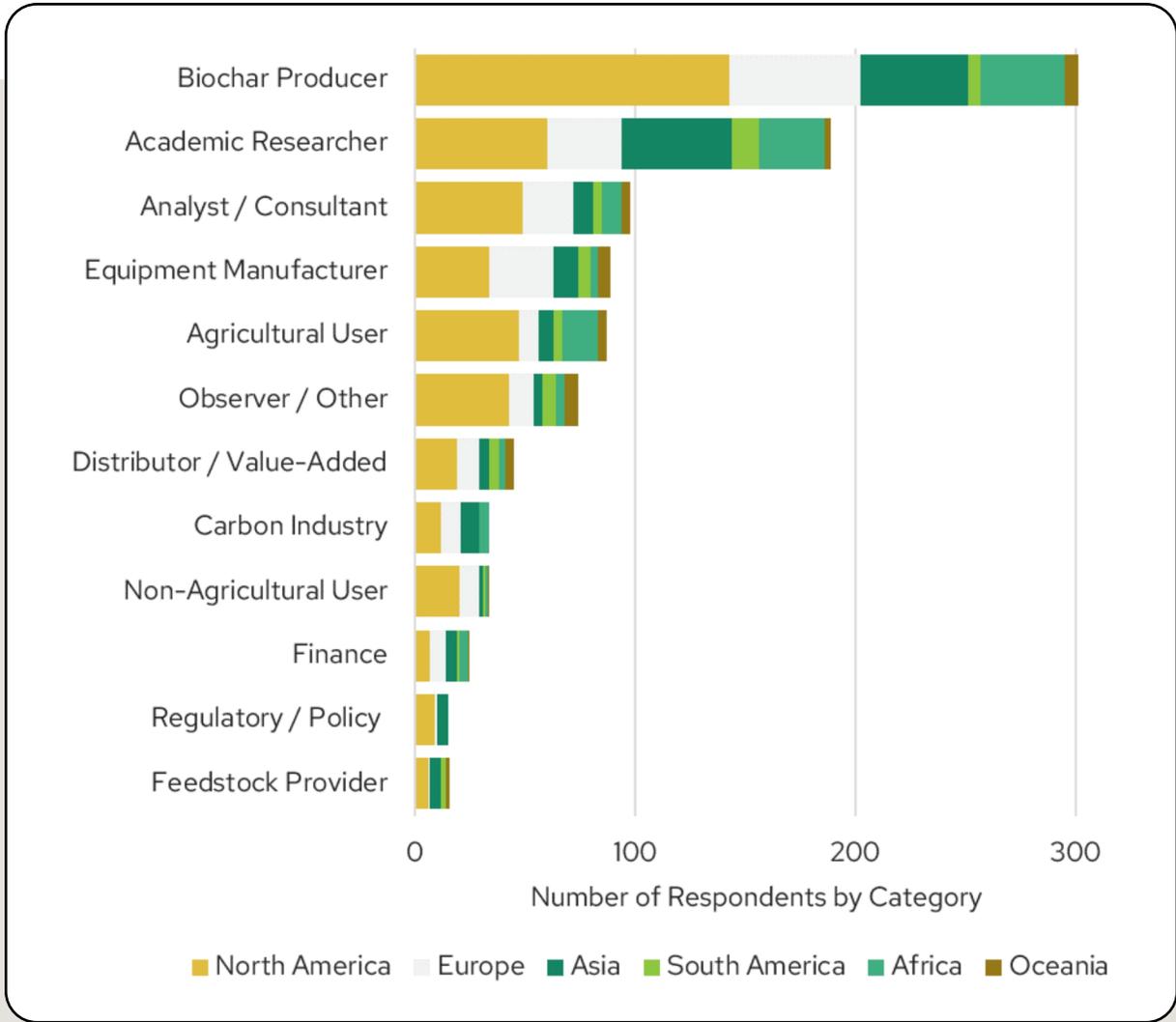
- 1. Biochar continues to lead the way in delivering durable CDR with global production of at least 350,000 metric tonnes of biochar in 2023, a 91% CAGR over reported 2021 production. From an economic perspective:**
 - i. Revenues from biochar producers, distributors, value-added producers, and equipment manufacturers exceeded \$600M USD in 2023, with a CAGR of 97% between 2021 and 2023.
 - ii. Revenues are projected to grow further to nearly \$3.3 Billion by 2025.
- 2. CDR markets for biochar carbon credits are thriving, but a majority of biochar producers do not generate Biochar Carbon Removal (BCR) credits for the VCM.**
- 3. Markets for biochar are growing, but developing high quality markets for physical biochar is a leading obstacle to further growth in the industry.**
- 4. Within and between global regions, biochar producers use a wide range of production technologies and business models. Building an industry that works for all scales and models is key.**
- 5. The industry is expecting biochar organizations to focus on:**
 - Developing end-use markets and standards for physical biochar
 - Advocating for biochar in the CDR space and in governmental policy
 - Supporting biochar companies to improve access to capital and grants

Beyond these five highlights, this report includes key findings among and between global regions and within different subsectors of the industry.

Survey methodology details can be found in the Methodology section.

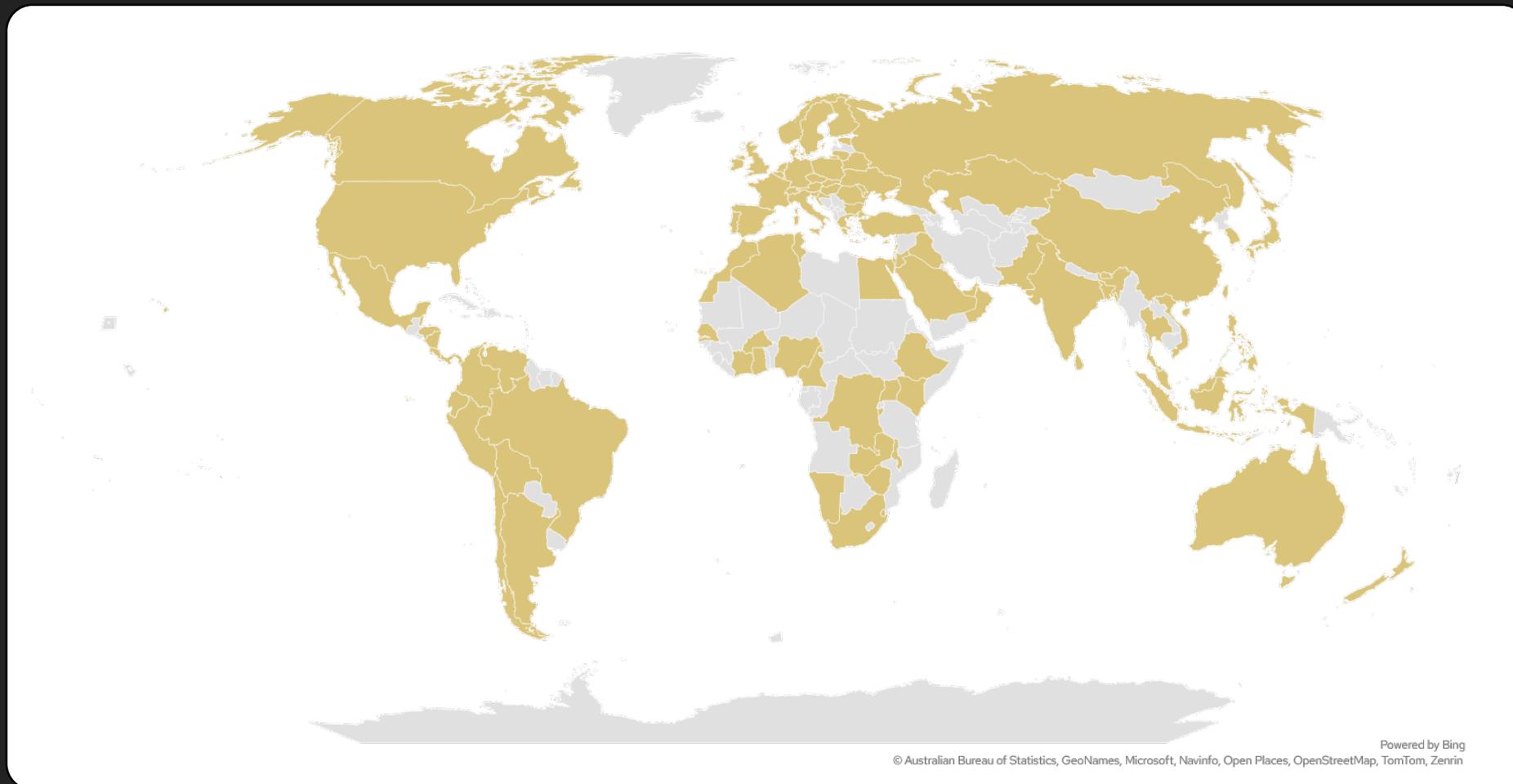
A Word on this Market Research

Industry Composition



This report provides insights gathered through 1,007 survey responses from just over 100 countries and multiple stakeholder groups within the biochar industry.

Countries Represented



While the survey response rate was significant and included all continents, this project clearly reached only a subset of the global industry and there are geographic gaps that IBI and USBI intend to address in future market research via heightened engagement with regional and national groups. In particular, we believe the strong response rate from North America overrepresents the role of North America in the global industry, on a relative basis, likely because the project was a collaboration between IBI and USBI, with global and North American focus areas, respectively. Along with other improvements, we aim to achieve similar response rates from all global regions in future iterations of this survey.

Biochar Industry Growth: Gigatonne Pathway

Biochar producers surveyed for this research reported global production of at least 352,304 mt in 2023, equivalent to at least 650,000 mt of CDR (assuming an average of 1.9 mt CO₂ removed per mt of biochar). This global production value represents rapid production growth of 91% CAGR compared to 2021 values that were also reported in this survey. The industry also expressed strong optimism for the next two years, sharing projections for growth to 2.6 million mt, which would require greatly expanded market demand for physical biochar, swift technological advancements in production and use, and rapid capital deployment, among other factors. Finally, strong reported economic growth for biochar equipment and technology companies illustrates a rapidly growing early-stage industry, a factor that may decrease with industry maturation as revenues shift towards biochar producers.

Though the data collected during this survey showed remarkable growth and production, it is likely that many producers and other stakeholders did not participate in this first annual survey. In particular, based on data reviews and general inquiries to biochar companies, some very large industrial producers did not participate in the survey, and response rates were lower in certain regions, particularly outside of North America and Europe. Future reports are anticipated to be more comprehensive on both points.

Global Biochar Production

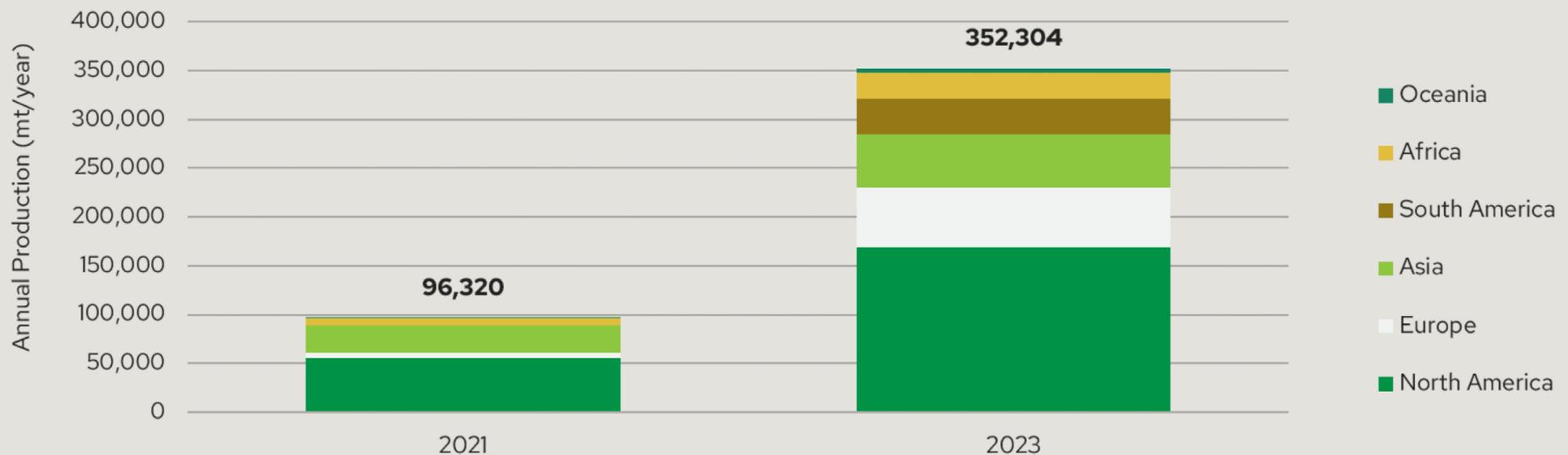


Figure 1. Estimated global biochar production in metric tonnes (mt) by year based on values reported by Biochar Producer category respondents. Details on calculation approach presented in Methods section.

Global Economic Value

Industry Members	2021	2023
Biochar Producers	\$54,750,000	\$330,130,000
Distributors and Value-Add Producers	\$7,250,000	\$38,880,000
Equipment Manufacturers	\$94,380,000	\$241,250,000
Total Revenue	\$156,380,000	\$610,260,000

Table 1. Global revenue generated by the biochar industry. Data are based on self-reported revenue categories for key industry categories.

Biochar Industry Economic Value

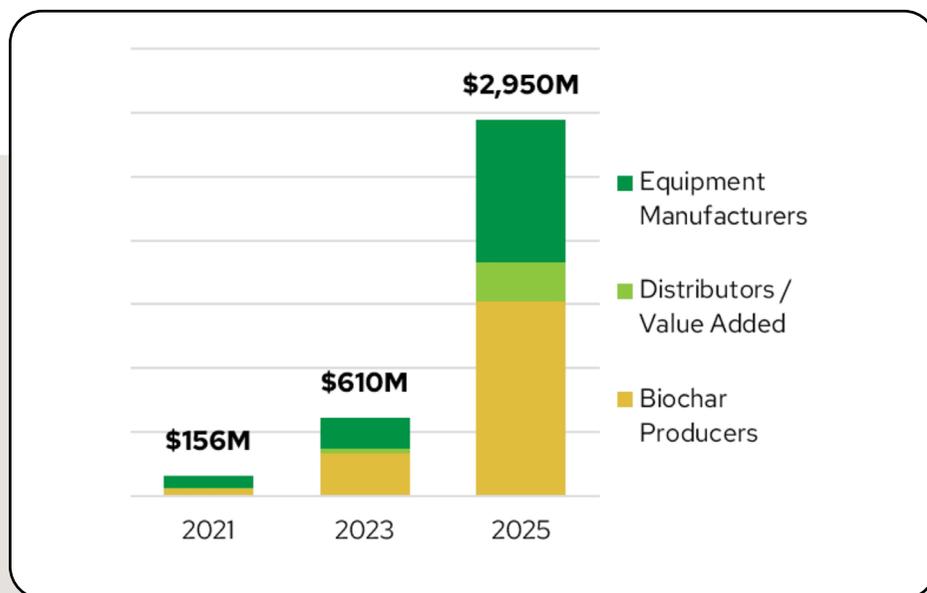


Figure 2. Estimated economic value of biochar industry based on self-reported revenue from equipment manufacturers, distributors and value-added producers, and biochar producers. reported by Biochar Producer category respondents. Details on calculation approach presented in Methods section.

As the industry matures, the annual growth rate will likely stabilize at a lower rate, which still provides a clear pathway for BCR to sequester one gigaton of carbon dioxide (CO₂) annually by 2040 with a 54% CAGR. Sustaining this growth rate will be an enormous challenge, however, current industry growth and reported future outlook optimism gives hope that it is attainable.

It is worthwhile noting this in the context that the biochar industry received only 12% of funding for CDR technologies, while in 2023, BCR delivered over 90% of carbon removal in the voluntary carbon markets according to data from [CDR.fyi](https://www.cdr.fyi). Additional funding for the biochar industry, particularly focused on market development and large volume production facilities, could support the growth of BCR as a climate change mitigation tool.

Notably, awareness of, and demand for, physical biochar are both a leading growth factor and a major obstacle to future growth, clearly indicating that increasing both should be a key focus for biochar industry organizations.

Biochar continues to lead the way in delivering durable CDR with global production of at least 350,000 metric tonnes of biochar annually, a 91% CAGR over reported 2021 production.

Key Drivers and Benefits of Biochar

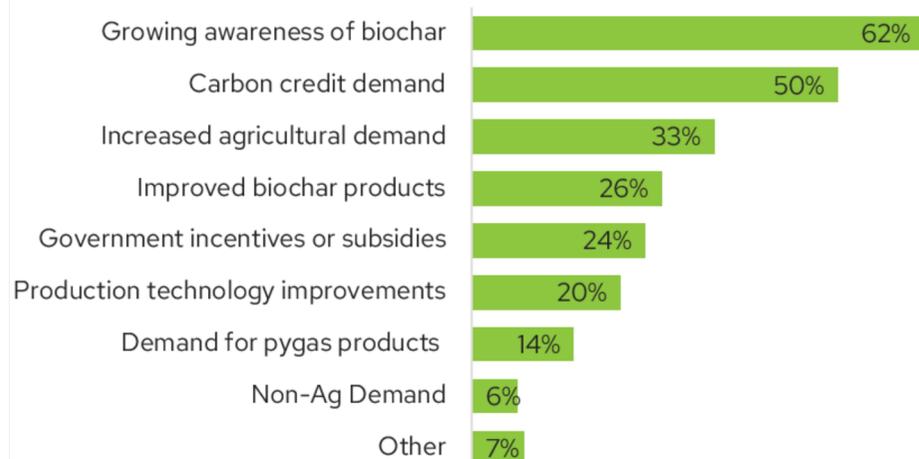


Figure 3. Top responses when asked "What do you believe are the primary factors driving the growth of the biochar industry in your country? (Please select up to top three)".

Key Inhibitors to Growth

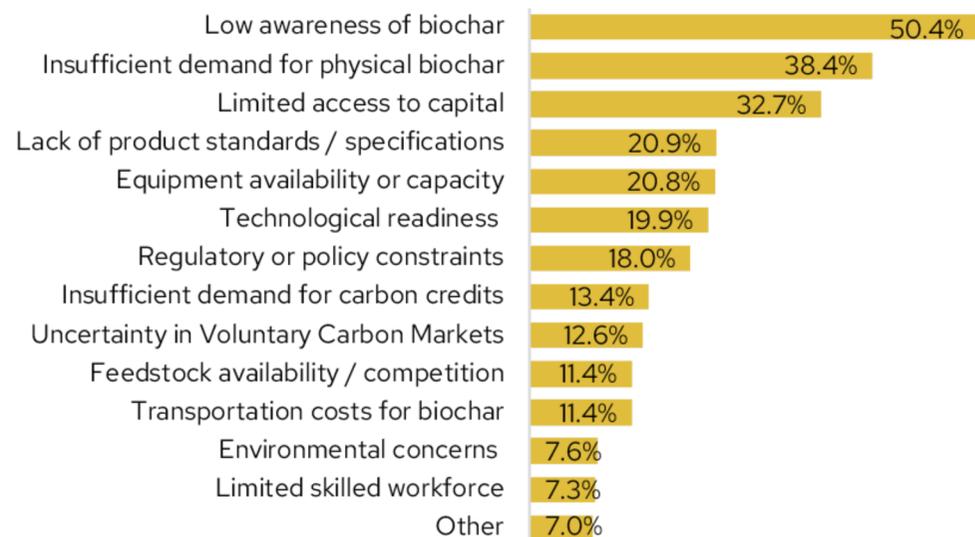


Figure 4. Top responses when asked "What do you perceive as the primary challenges or obstacles to expanding biochar production and use in your country? (Please select up to top three)".

Carbon Markets and the Biochar Industry: High Economic Impact but Low Participation Rates

Revenue from selling BCR credits in the voluntary carbon market is reported as the second largest growth driver for the biochar industry. However, 58% of surveyed producers, representing over 50% of reported global production, do not report any income from carbon credits. This result is in contrast to the very high credibility biochar carbon credits hold among carbon industry respondents.

Additional requirements within existing carbon credit methodologies may prevent projects from generating carbon removal credits, even those which would otherwise be eligible because some projects may be considered “business as usual.”

Another potential reason for low participation in carbon markets is the expense and difficulty of becoming certified to sell carbon credits, as well as the costs to participate in carbon marketplaces.

In the future, there could be opportunities for biochar insetting to reduce value chain emissions, thus creating additional opportunities for valuing the carbon removal and avoidance benefits of biochar production and use, however, value-chain emissions frameworks are not yet aligned for biochar insetting.

Table 2. Total biochar production by percent of producer revenue generated by BCR credit sales. Production values do not include blank responses to carbon credit revenue question, so total production reported in table is less than total annual production for 2023 in Figure 2 and percent global production values do not sum to 100%.

Carbon Credit Revenue Among Biochar Producers

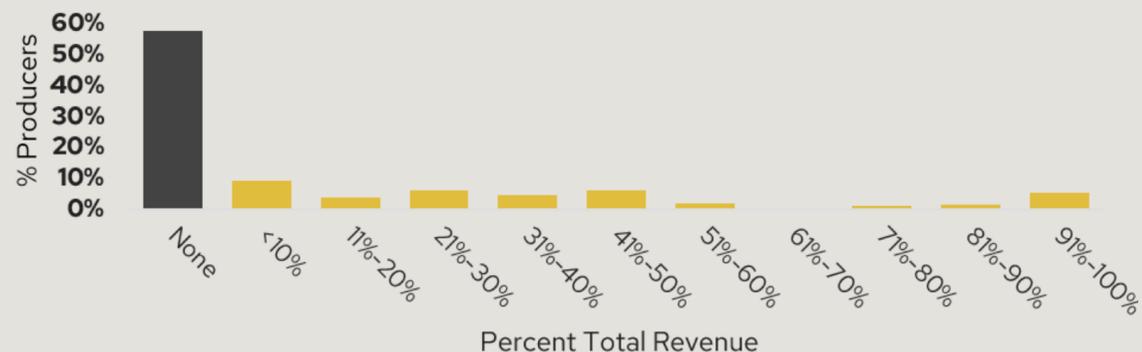


Figure 5. Percent of total biochar producer revenue generated from biochar carbon removal credits.

Percent Revenue from BCR credits	Total Global Production (mt/year)	Percent Global Production
None	178,036	51%
<10%	15,236	4%
11%-20%	14,455	4%
21%-30%	13,544	4%
31%-40%	18,985	5%
41%-50%	22,484	6%
51%-60%	2,735	1%
61%-70%	9,000	3%
71%-80%	200	0%
81%-90%	500	0%
91%-100%	47,134	13%

Markets for Physical Biochar

Existing End-Use Markets

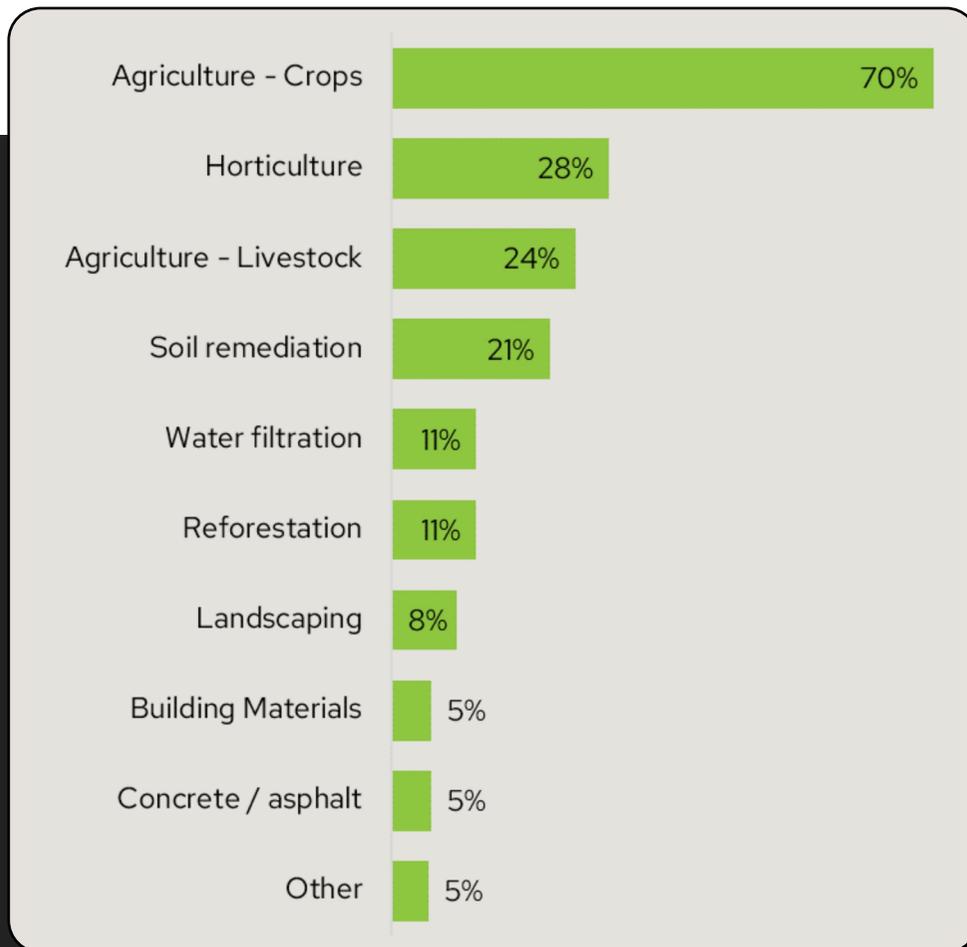


Figure 6. Top end-use markets for biochar among producers when asked “What are your primary end-uses for your biochar? (Please select up to top three)”.

Markets for biochar are growing, but developing high quality markets for physical biochar is a leading obstacle to growth in the industry.

Respondents confirmed that agriculture-centric biochar markets, including crops, horticulture, and livestock feed and manure management, remain the top uses for biochar, followed by soil remediation, water filtration, and forestry. Coming up behind these are burgeoning non-soil or agricultural uses, notably concrete and other industrial materials.

Within agricultural biochar uses, responses pointed to focusing on biochar-enhanced fertilizer and soil amendment products to help develop market demand for biochar.

Driving up demand for physical biochar, alongside increasing awareness of biochar-based products and alignment with relevant material standards, are key to scaling the industry. Industry associations like IBI and USBI should focus on helping develop demand for biochar to support this growth.

Role of Certification

More than half of biochar producers do not produce biochar to any certification or standard, however, standards were listed as the fourth most prevalent obstacle to industry growth. This contrast suggests a need for improved and/or expanded certifications and standards to catalyze end-use market growth.

Priority Markets for Industry Growth

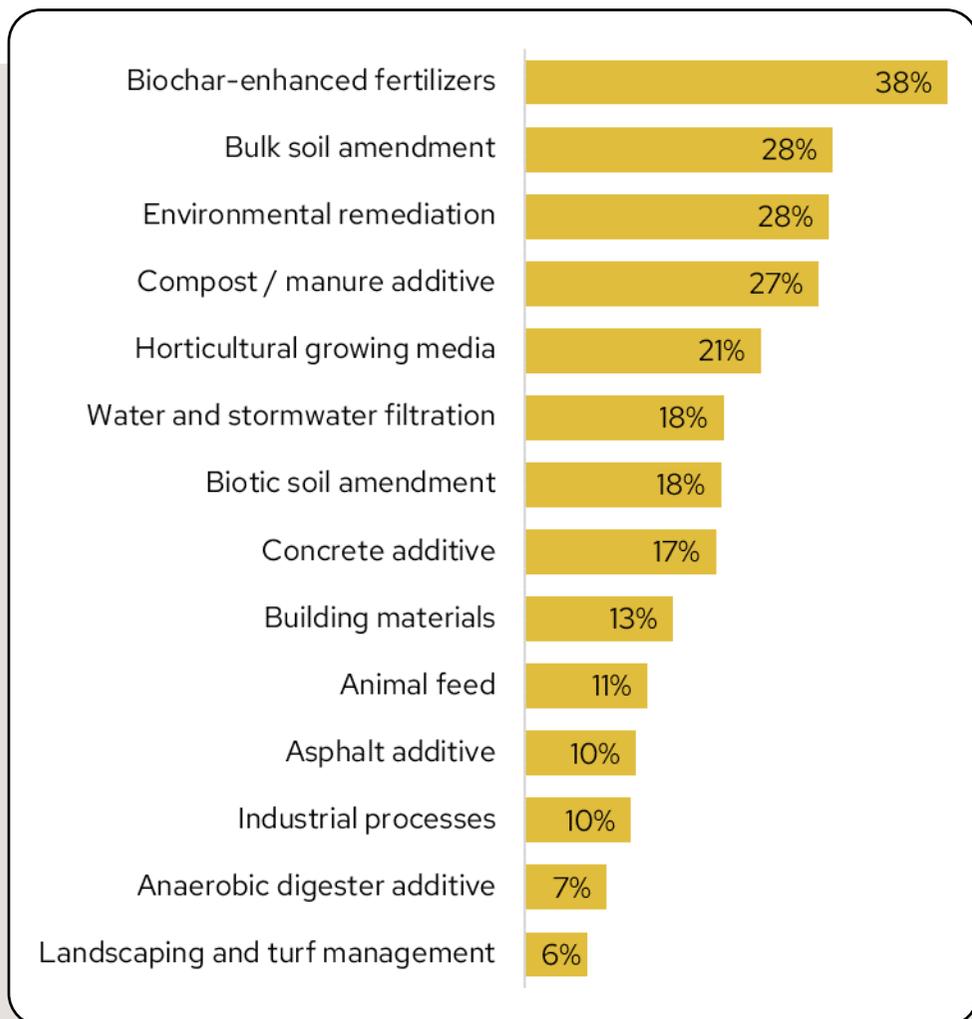


Figure 7. Priority end-use markets for biochar organizations to focus market development activities among all respondents when asked “Increasing market demand for biochar is a key focus of USBI and IBI. Which end-use markets should USBI and IBI prioritize as part of an upcoming market segment analysis? (Please select up to top three)”.

Certifications Used by Producers



Figure 8. Biochar certifications used by biochar producers when asked “Do you produce certified biochar? If so, which certification standards do you use? (Please select all that apply).”

Biochar Producers Use a Range of Technologies

Biochar producers reported using a wide variety of technologies and production systems types, illustrating a key facet of the global biochar industry: that there is a broad variety of biochar production techniques to fit local conditions. From small, mobile units processing non-commercial forestry residues in the vast US public lands, to large facilities producing 10,000 mt of biochar or more per year, to kilns used by small-holder farmers, biochar production is able to meet a considerable range of purposes and provide economic value in varied local scenarios.

Survey results, combined with reported current and future production data, suggest that the majority of production growth will come from stationary, larger scale systems, particularly as ever greater industrialized technologies are developed and deployed.

However, the relatively low response rate in the Global South could mean that small scale, distributed kiln production systems are more prevalent than reflected in these data. Furthermore, the co-benefits of such production systems, such as reduced particulate emissions from open-pile burning, are substantial, so supporting these small scale systems, even if they represent a shrinking share of global production and BCR, should remain a priority.

Production System Types

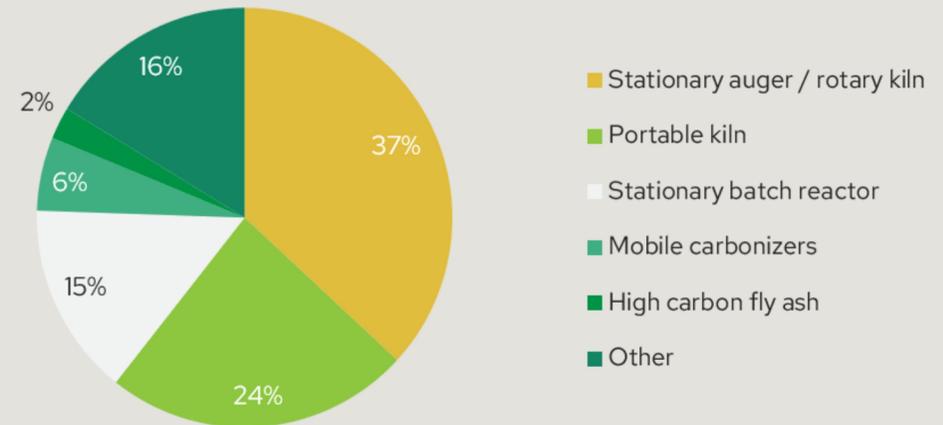


Figure 9. Production system types used by biochar producers.

Production System Sourcing

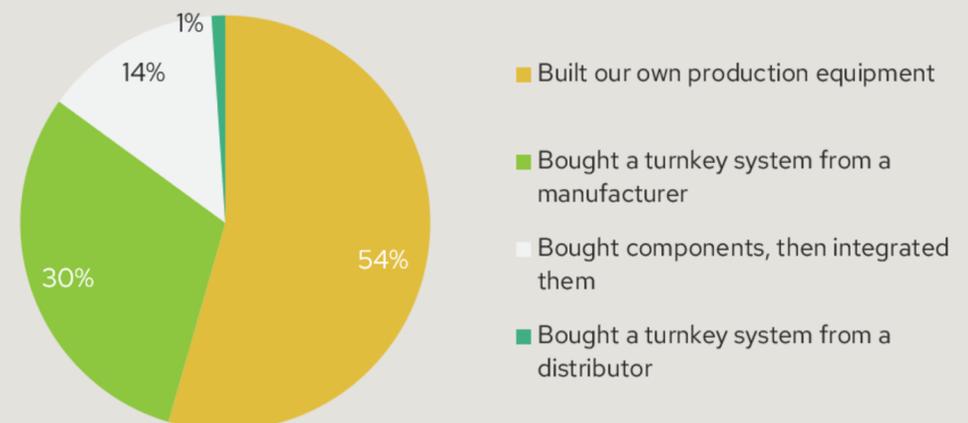


Figure 10. Production system procurement approaches used by biochar producers.

Global Production by Technology Type

A wide range of production technologies and business models are used by biochar producers. Building an industry that works for all scales is a key need.

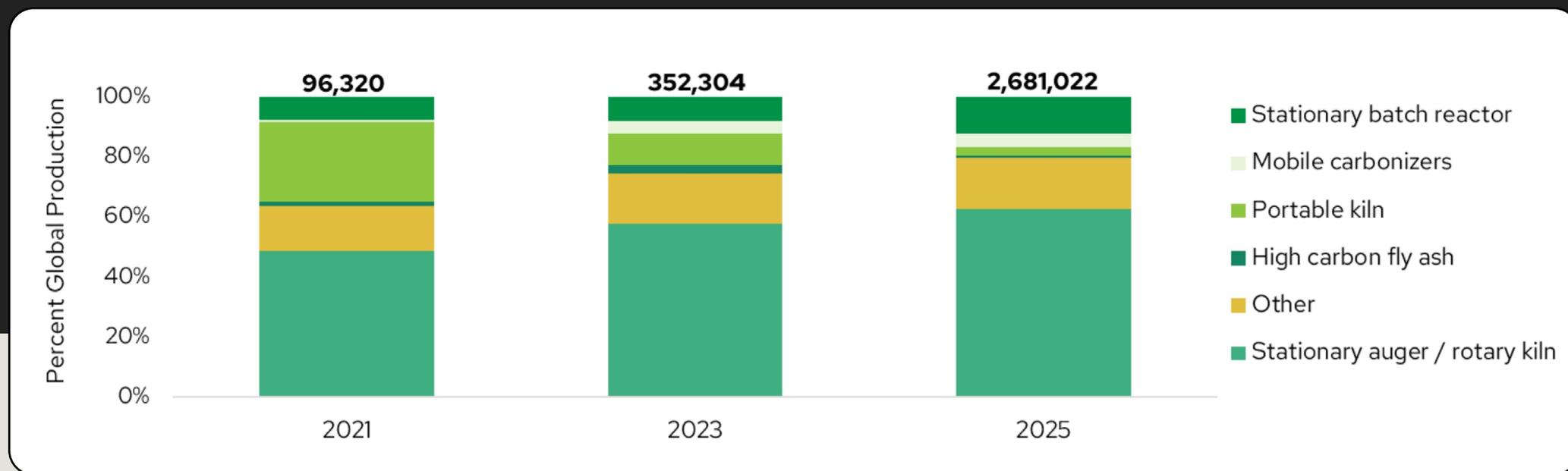
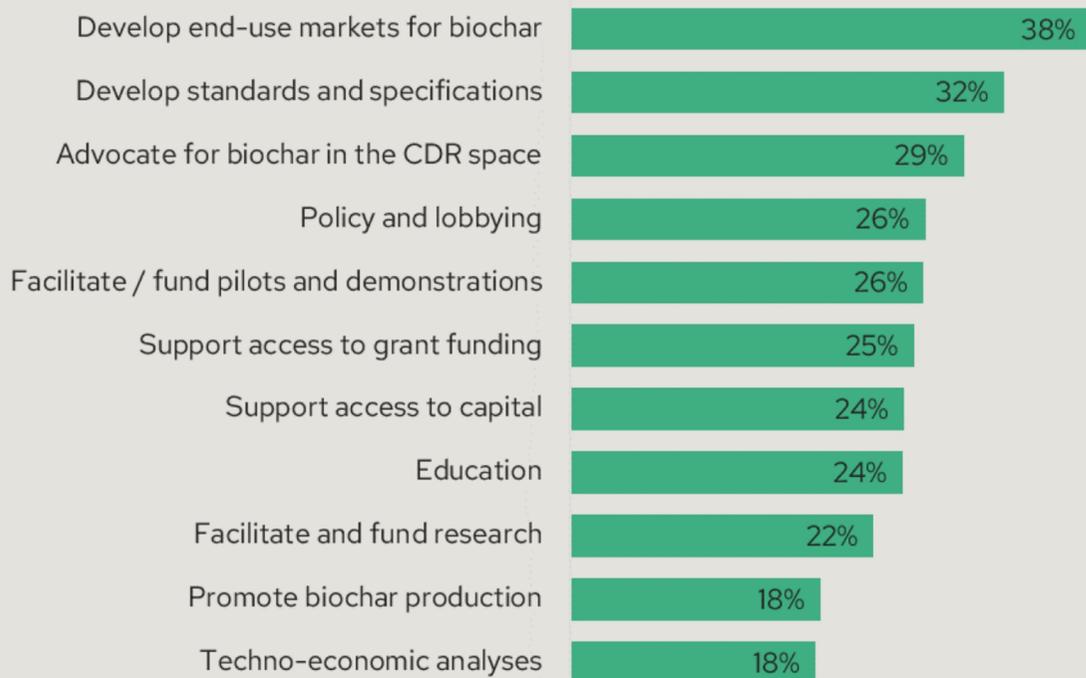


Figure 11. Percent of global biochar production by production technology types based on responses from biochar producers. Values above stacked columns represent total production values (mt/year) for each year. Values for 2025 are projected values reported by biochar producers.

Role of Biochar Industry Organizations

Priorities for Biochar Organizations



As biochar industry organizations exist for every major continent, and in over 20 individual countries, industry stakeholders are increasingly engaging with and relying upon these groups.

Industry organizations can help support growth by increasing market demand for physical biochar, developing industry-relevant standards, increasing biochar's prominence within the carbon removal industry, as well as enhancing industry access to funding from public and private sector sources.

Respondents also emphasized the need for expanded education offerings to support the industry, particularly around biochar business models, biochar benefits, carbon markets, as well as training in how to create products from biochar.

Figure 12. Key priorities for biochar organizations based on responses to "What are the key areas where you think biochar associations should focus their time? (Please select up to top three)".

Key Educational Needs

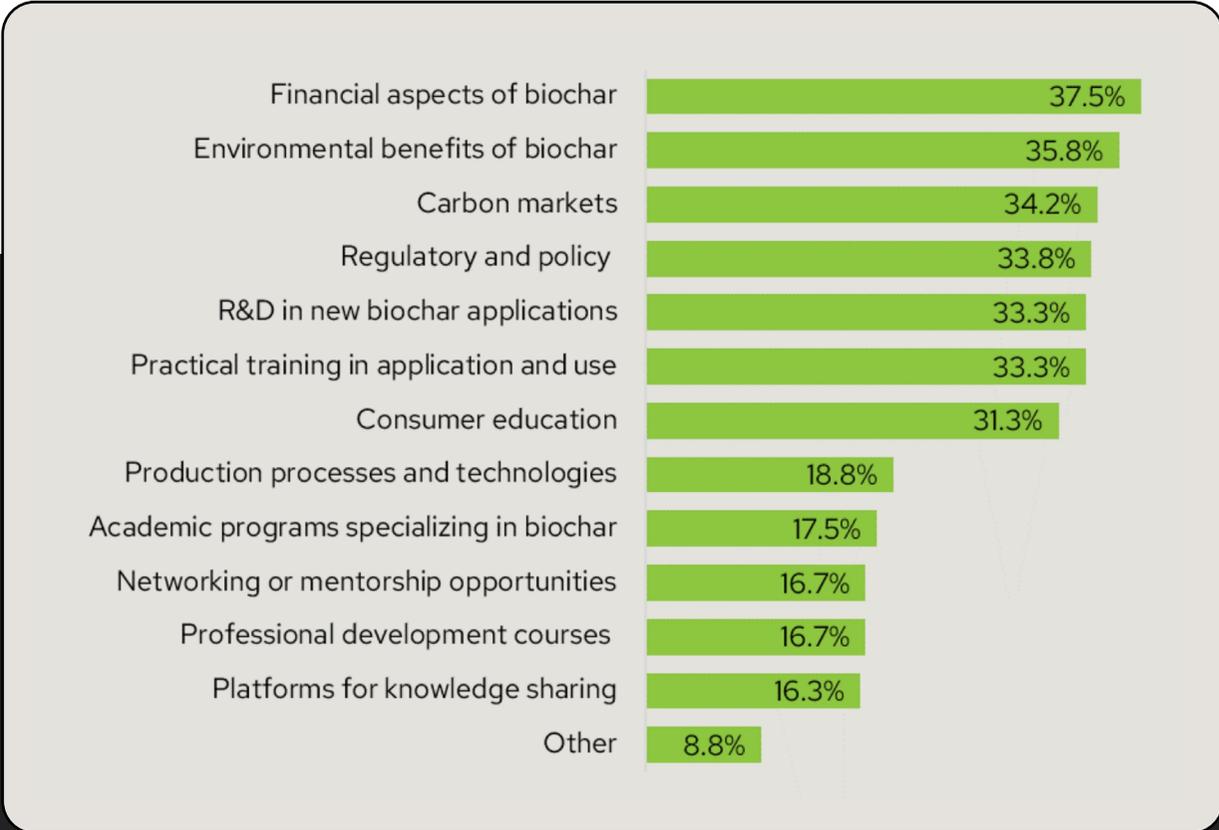


Figure 13. Key education needs identified based on responses to “What educational needs do you think are not currently being met for the biochar industry? (Please select up to the top three)”.

The industry is expecting biochar organizations to focus on:

- *Developing end-use markets and standards for physical biochar*
- *Advocating for biochar in the CDR space and in governmental policy*
- *Supporting biochar companies improve access to capital and grants*

Biochar Industry by Geography

The 2023 market research survey had respondents from all major continents, and over 100 countries with a distribution of small to larger scale producers.

While there were responses from smaller producers in every region, the majority of total production in every region was reported by companies producing at least 1,000 tons of biochar annually, though Africa and Asia had a larger share of production among small scale producers. It is possible that some of the larger production numbers in all regions were aggregated data representing production from multiple smaller production locations such as mobile kilns. In the next year, with more funding coming online to support Global South biochar projects, this survey will track scaled production growth in the industry across geographies and production types.

Production by Producer Size

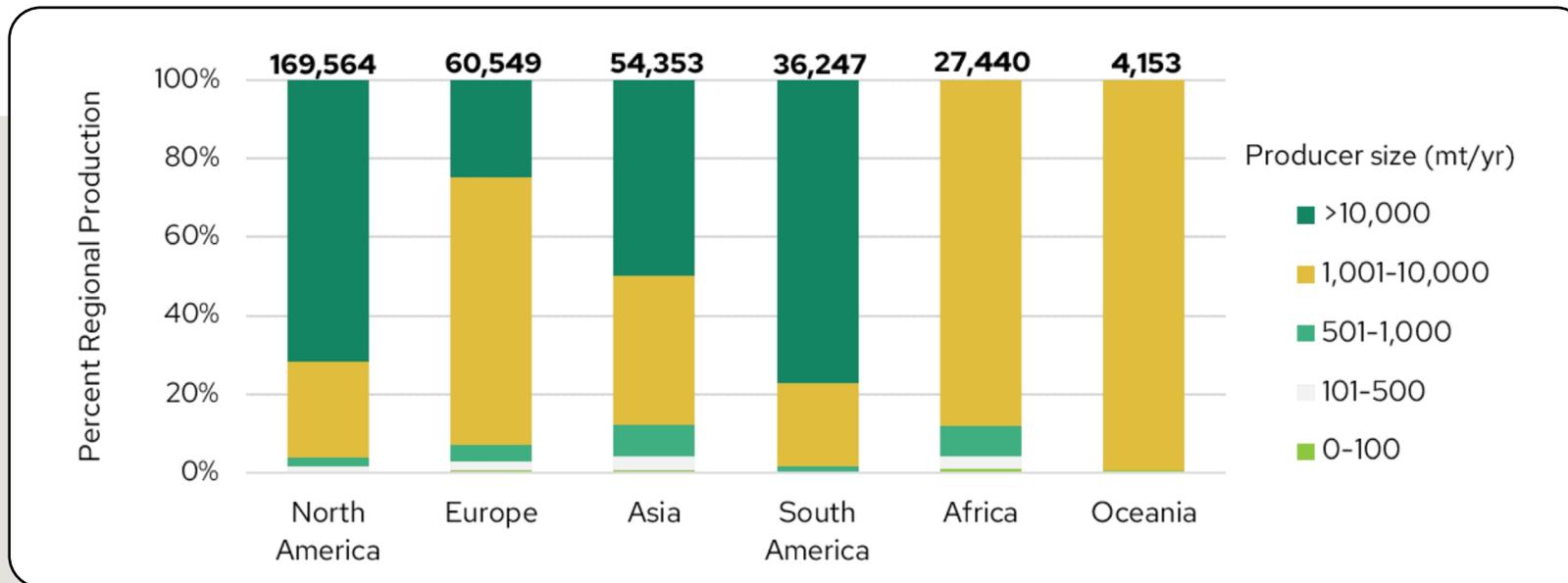


Figure 14. Biochar production by producer size in global regions in 2023. Values above columns are total regional production values reported by producers.

Production by Technology

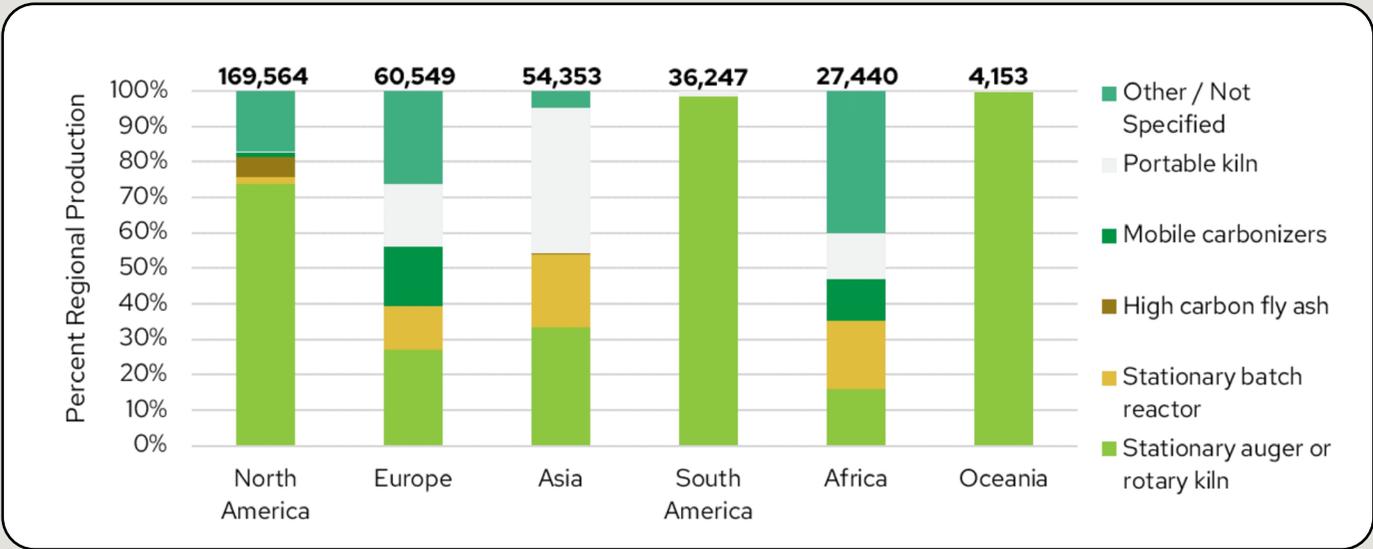


Figure 15. Production by technology type in global regions. Values above columns represent total 2023 production in each region.

BCR Credit Revenue

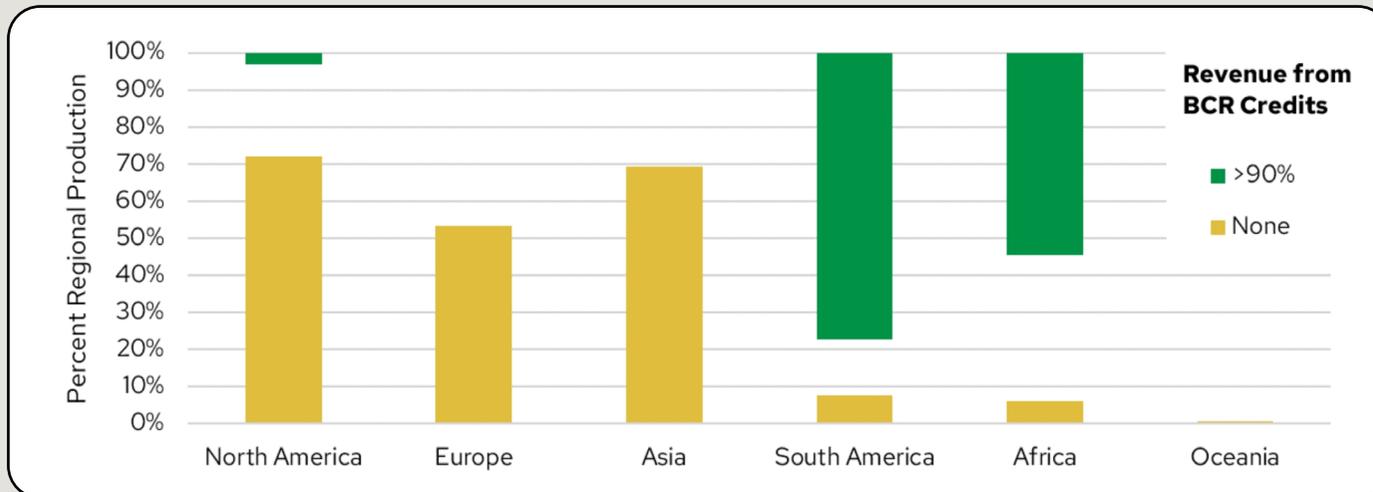


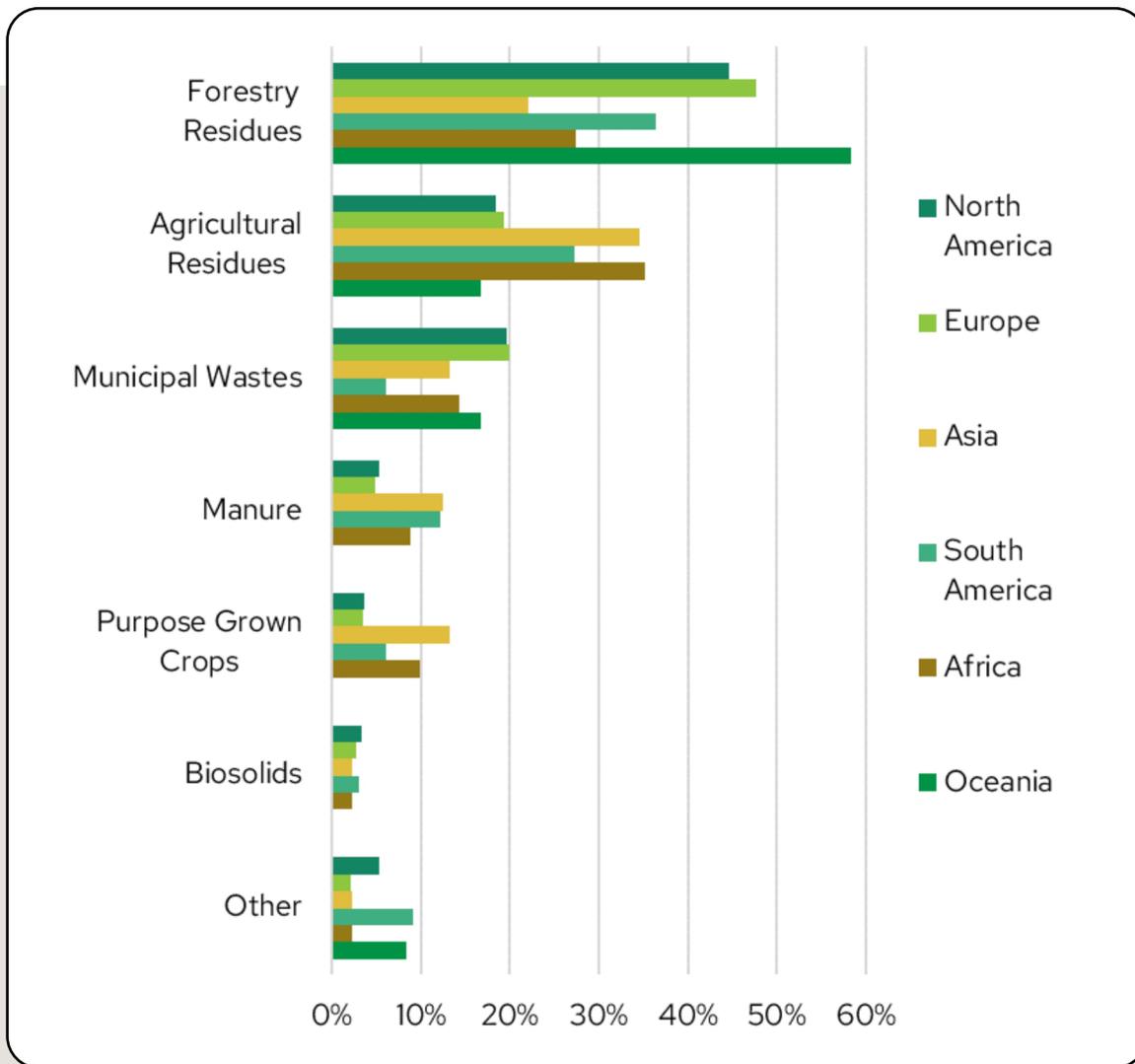
Figure 16. Total regional biochar production associated with BCR credit revenue buckets among biochar producers in 2023.

Responses about technology and equipment to produce biochar showed fairly distinct differences by region, with some overlaps by technology and location. Stationary auger or rotary kiln systems, frequently very industrial, represented the majority of production in North America, South America, and Oceania. Survey respondents reported portable kiln production as a significant share of regional production in Africa, Asia, and Europe, while stationary batch production systems are prevalent only in Europe, Asia, and Africa. High carbon fly ash extraction was prevalent only in North America.

Noting that 58% of all respondents reported not receiving revenue from selling carbon credits, producers in South America and Africa have high BCR credit market participation, with over half of regional production in those regions from biochar producers that generate more than 90% of their total revenue from carbon credits sales.

Relatively low labor costs in these regions, paired with BCR credit prices that are relatively unaffected by geographic origin appear to create viable business models in these regions that rely nearly exclusively on BCR credit revenue.

Feedstock by Region



Conversely, large amounts of biochar in Asia, Europe, and North America is produced by companies that generate no carbon credit revenues at all. It is possible that these regions, which have been among the earliest adopters of biochar production, are home to producers that were operating before BCR credits became available, which would disqualify such projects from selling BCR credits due to methodology additionality requirements. This may present an opportunity for such companies to embed carbon removal benefits from biochar production directly into value-chain emissions accounting (i.e. insetting), as long as the biochar production and/or use is within Scope 1, 2, or 3 emissions of a given company.

The most common feedstocks in most regions were forestry residues, with the exceptions of Africa and Asia, where agricultural residues were reported as the most commonly used. The least commonly utilized feedstocks across the represented geographies were manure, biosolids, and purpose-grown crops.

Figure 17. Feedstock sources among biochar producers in global regions. Data represent percent of producers in each region that use each feedstock type. Some producers reported using multiple feedstock types, so the total values are greater than 100% for each global region.

Stakeholder Groups Analysis

BIOCHAR PRODUCERS

Biochar producers were the largest respondent category at just under a third of total responses, and they reported that agricultural and forestry biomass were the dominant feedstocks. A majority of biochar producers reported that they use value-added processing to create biochar-based products, highlighting a trend towards post-processing and productization to drive demand for biochar.

More than 75% of producer respondents reported utilizing gas produced during biochar production (syngas, pyrolysis gas, or other forms of vapors), most commonly combusted to produce heat to dry feedstock, to produce heat for another process, or to produce electricity. Smaller percentages of producer respondents reported utilizing this gas to condense into liquids for fuels, agricultural inputs, or for enhanced carbon removal, and a small fraction of producer respondents reported utilizing gas to produce hydrogen. While these advanced gas utilization techniques are currently relatively uncommon, they represent alternative business models that may provide competitive advantages and become more common as the industry matures.

Key Feedstocks

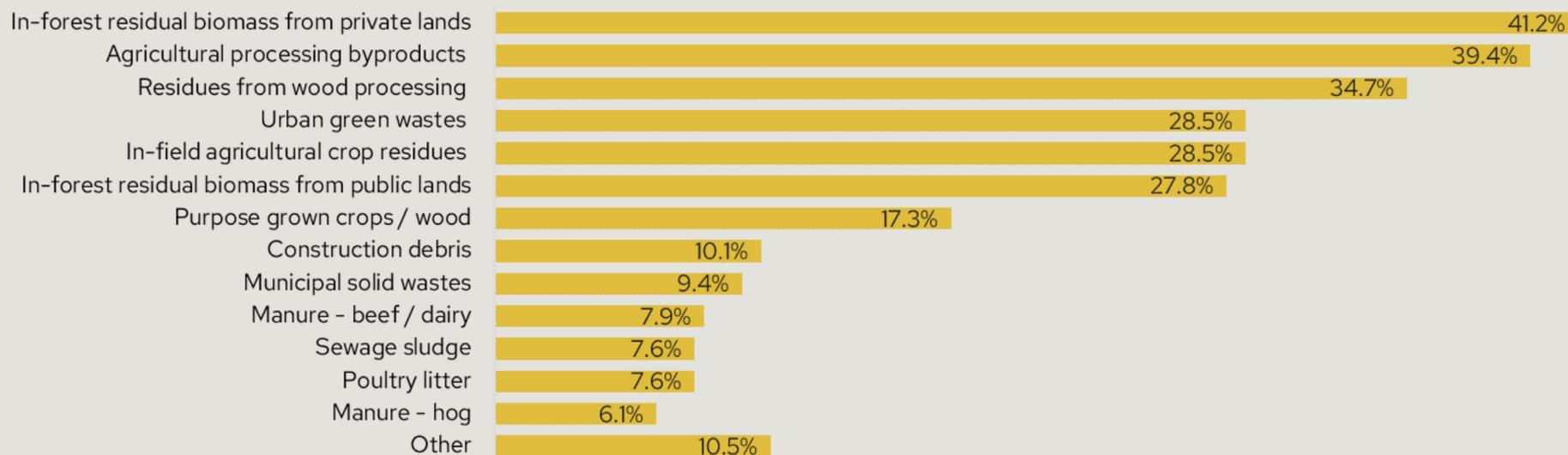


Figure 18. Biochar producer feedstocks reported when asked "What type of feedstocks are used for your biochar? (Please select all that apply)".

BIOCHAR PRODUCERS

Among producer respondents, nearly a quarter indicated they do not capture heat or gas released during biochar production, possibly associated with producers using portable kilns, mobile carbonizers, or similar production technologies where heat capture is difficult.

Among other respondent categories, it is worth noting that some respondents that did not primarily identify as Biochar Producers, notably Equipment Manufacturers, indicated that they also produce biochar, or are seeking a time to enter the market.

The majority of biochar producers reported adding value to raw biochar, reflecting a trend toward productization of biochar which will be a key component of growing the market for physical biochar. Many reported processing methods are associated with adding nutrients, through composting, blending, and activation. Less than 20% of biochar producers reported adding no value to their biochar.

Adding Value to Raw Biochar

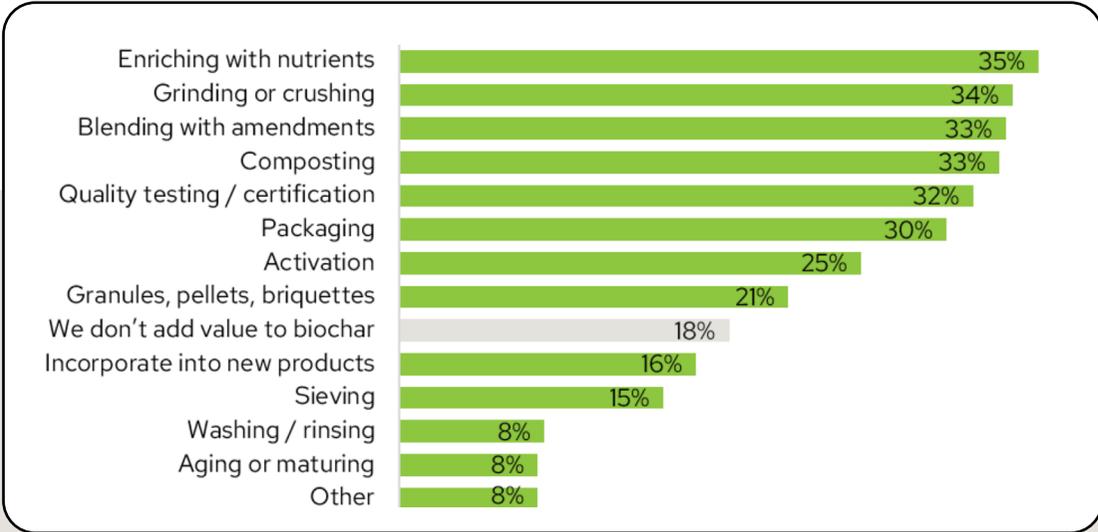


Figure 19. Biochar producer responses when asked “What post-production processes do you use to add value to the biochar you produce? (Please select all that apply)”.

Pygas End Use

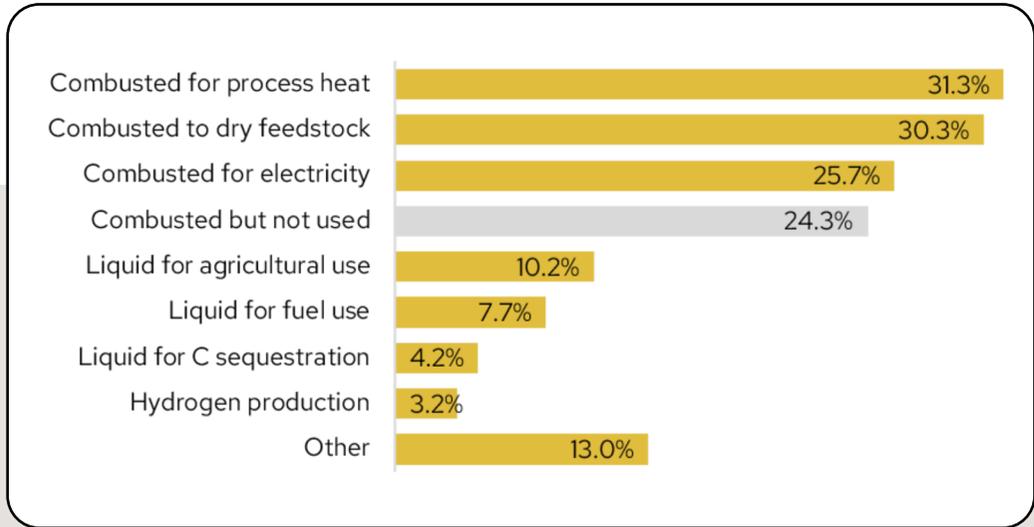


Figure 20. Pyrolysis gas end-use among producers when asked “How do you utilize pyrolysis gas in your biochar production process? (Please select all that apply)”.

EQUIPMENT MANUFACTURERS

Equipment manufacturers reported their main challenges to be related to access to capital, for customer financing but also for expanding equipment production. It is notable that while 28% of equipment manufacturers reported low demand as a challenge, the remaining 72% or equipment manufacturer respondents did not identify market demand as among their top three challenges, suggesting robust demand for most production equipment.

Equipment manufacturer respondents reported their top customers as small and medium businesses, and agricultural producers and processors. Notably, cities and wastewater treatment facilities were the fourth largest reported customer segment, however, current production from these feedstocks is still quite low, suggesting that biochar derived from biosolids and municipal solid waste feedstocks may become more common compared to their current more limited role.

Significant Manufacturing Challenges

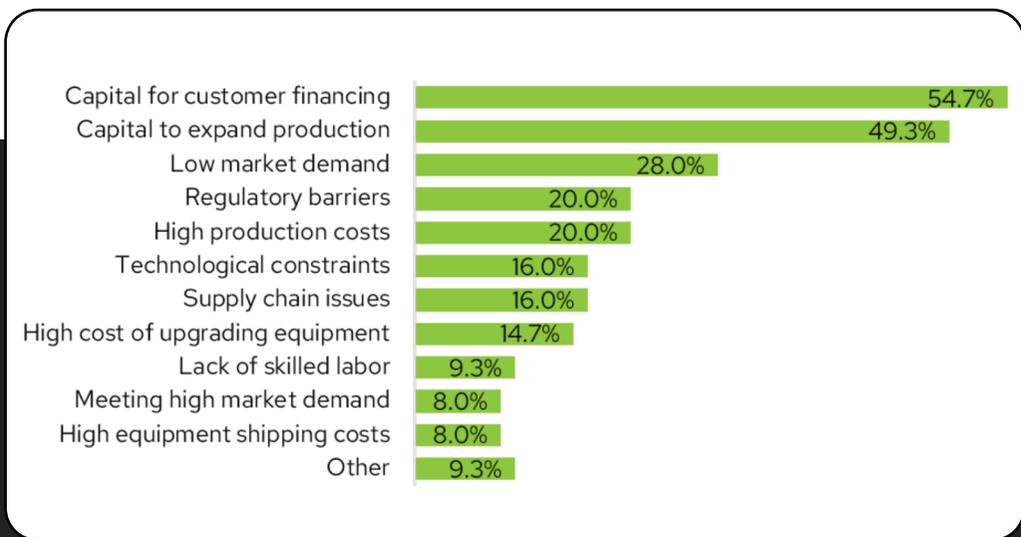


Figure 21. Primary challenges among biochar equipment manufacturers when asked "What are the most significant challenges your company faces in manufacturing biochar equipment? (Please select up to top three)".

Key Customer Segments

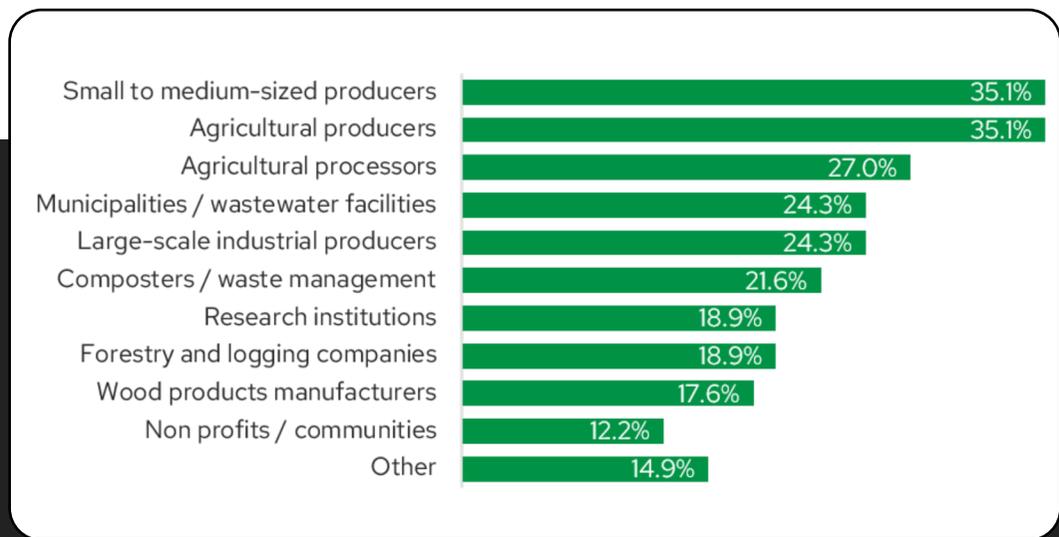


Figure 22. Leading customers among biochar equipment manufacturers when asked "What are your key customer segments? (Please select up to top three)".

DISTRIBUTORS & VALUE-ADDED PRODUCTION

Distributors and value-added manufacturers reported primarily selling biochar directly to end-users, as well as on a smaller basis to third-party distributors or to agricultural suppliers. Online sales were reported by only a small minority of distributors, possibly because biochar is a material typically sold in large volumes not common among online sales. This respondent segment reported focusing on raw material biochar characteristics including carbon content and contaminant levels.

Primary Distribution Channels

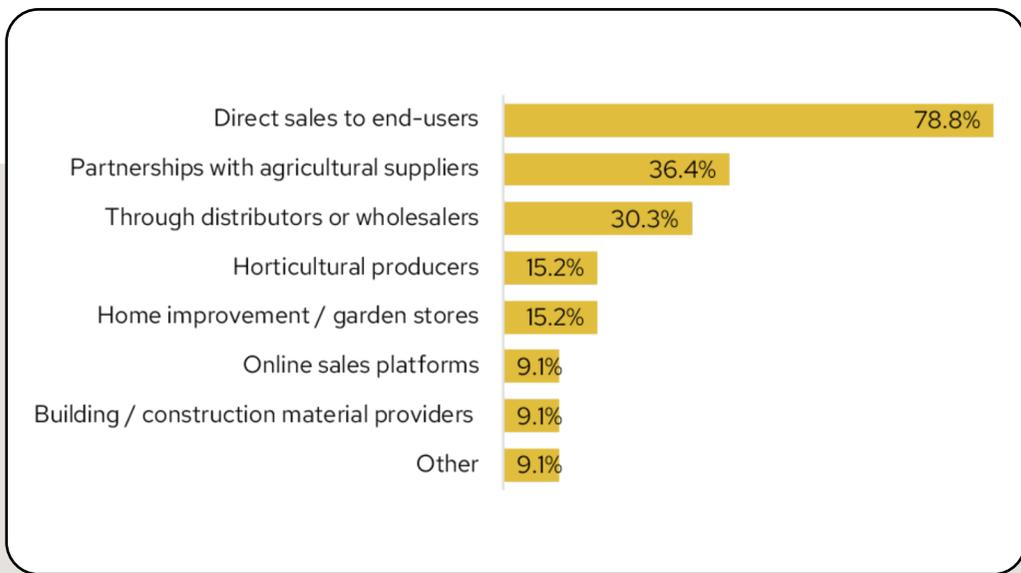


Figure 23. Primary product distribution channels reported by distributors and value-added producers when asked "Through which channels do you distribute your biochar and biochar containing products? (Please select all that apply)".

Key Product Specifications

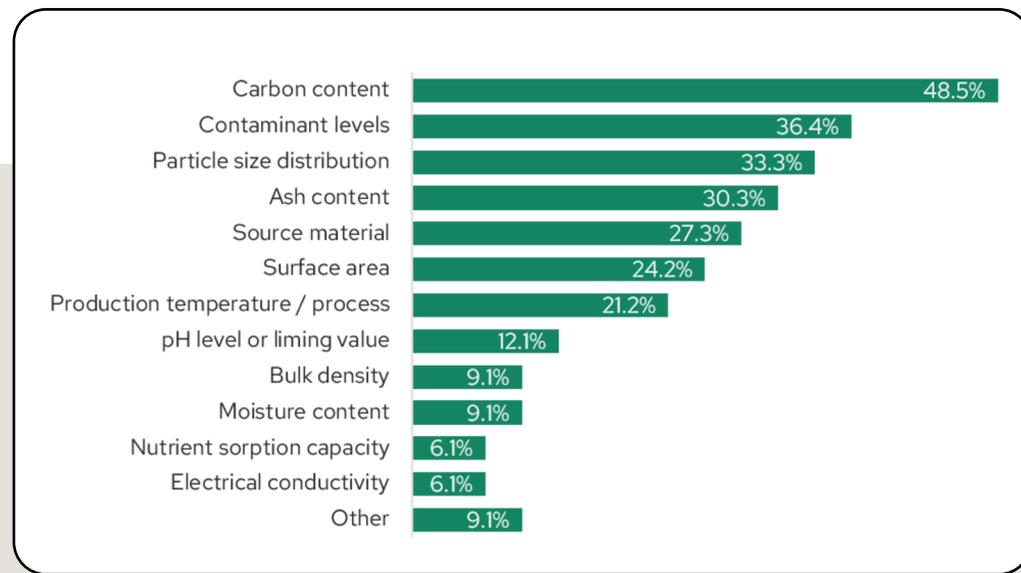


Figure 24. Key product specifications for biochar distributors and value-added producers when asked "What product specifications do you consider when sourcing biochar? (Please select up to top three)".

CARBON FINANCE

Perceptions of BCR Credit Quality

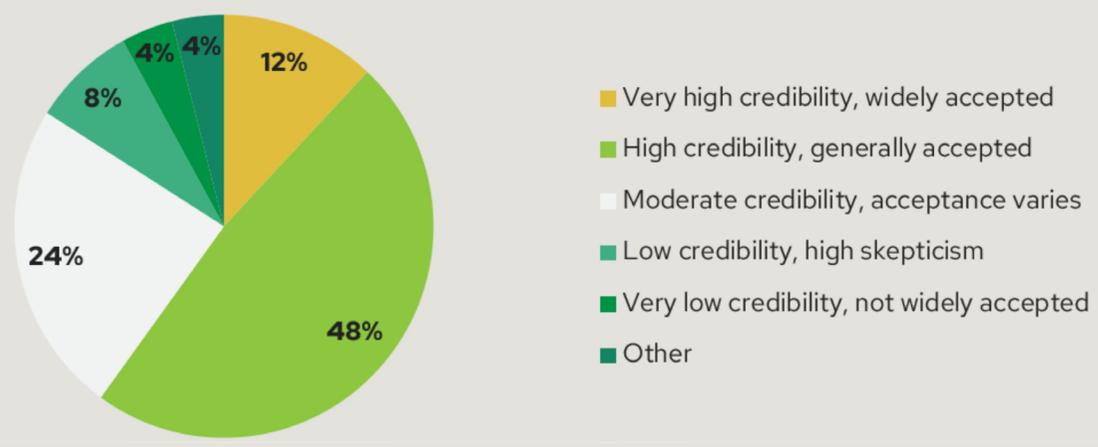


Figure 25. Perceptions of BCR credit quality among carbon industry respondents when asked: "How do you perceive the market credibility of biochar in carbon trading?"

The majority of carbon industry respondents considered BCR credits to have high or very high credibility in the CDR space, while only 12% considered BCR credits to have low or very low credibility, suggesting the potential for further increases in demand for BCR credits.

While encouraging, the nature of this survey being conducted by, and targeted at members of the biochar industry, likely results in an overestimate of BCR credit credibility, and future iterations of this survey will focus on increasing participation among carbon industry participants that are less familiar with biochar.

Variability in biochar quality and lack of product standards were reported as the two most pressing challenges for BCR credit Measurement, Reporting, and Verification (MRV) among carbon industry respondents, highlighting a critical need in the industry to develop more widely used material standards. Feedstock sustainability was also listed as a key challenge, as were data collection logistics and measurement complexities.

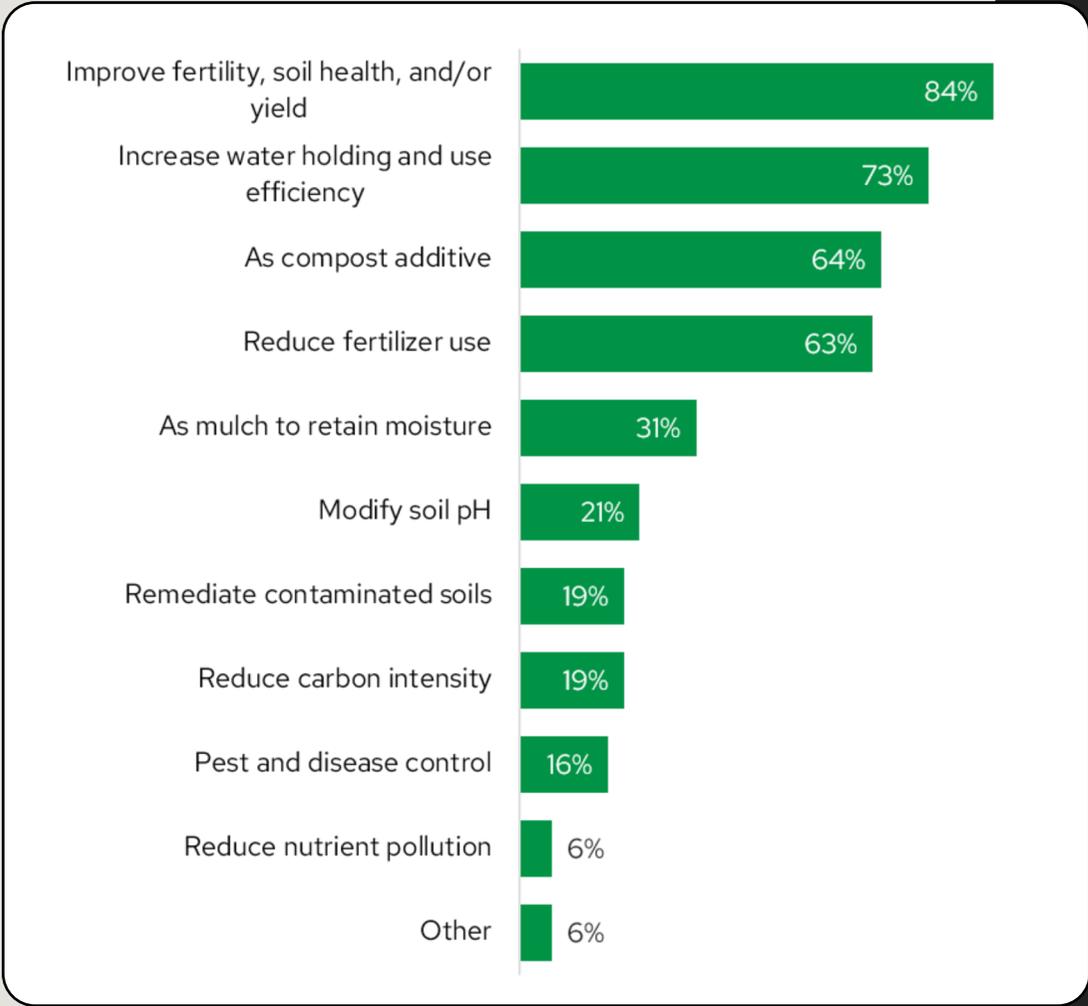
Measurement, Reporting, and Verification (MRV) Challenges



Figure 26. Challenges in monitoring, reporting, and verification for biochar carbon removal (BCR) credits reported by carbon industry members when asked "What challenges do you encounter in the MRV process for biochar carbon removal credits? (Please select up to top three)".

AGRICULTURAL USERS

Biochar Use Trends



Agricultural end-users reported using biochar primarily to reduce fertilizer and water needs and also to improve soil health, crop yield, and general soil fertility.

Using biochar as a compost additive was also very common, likely as a result of the benefits of this practice but also related to common guidance such as that provided by the US Department of Agriculture in Natural Resources Conservation Practice Standard 336: Soil Carbon Amendment.

Only 20% of agricultural end-users reported using biochar as a means to adjust soil pH, possibly because soil pH adjustment is typically cheaper to accomplish using agricultural lime than biochar.

Figure 27. Reasons for agricultural producers to use biochar when asked "How are you currently using biochar in your agricultural practices? (Please select all that apply)".

NON-AGRICULTURAL USERS

Among non-agricultural users nearly half used biochar primarily as a tool for soil remediation, with those using biochar in building materials a distant second. Among these end-users, consistency in biochar material properties was the most important sourcing consideration, followed by the greenhouse gas (GHG) emissions of production, proximity of the supplier, and price.

Other uses of biochar included soil and water remediation applications, as well as industrial and built environment, pointing to expanding markets for biochar use.

Biochar Use Trends

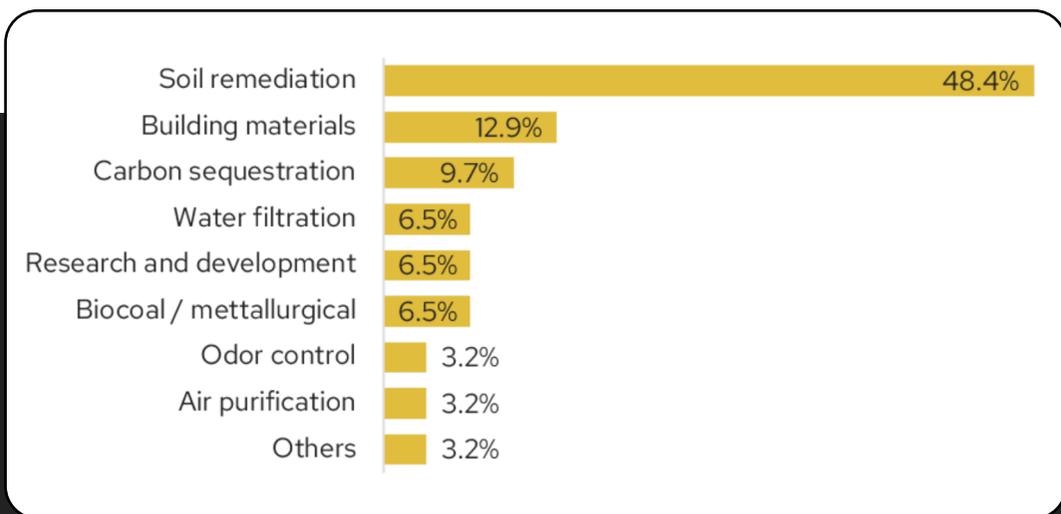


Figure 28. End-uses among non-agricultural biochar users when asked “What is your primary use of biochar? (Please select one)”.

Key Sourcing Considerations

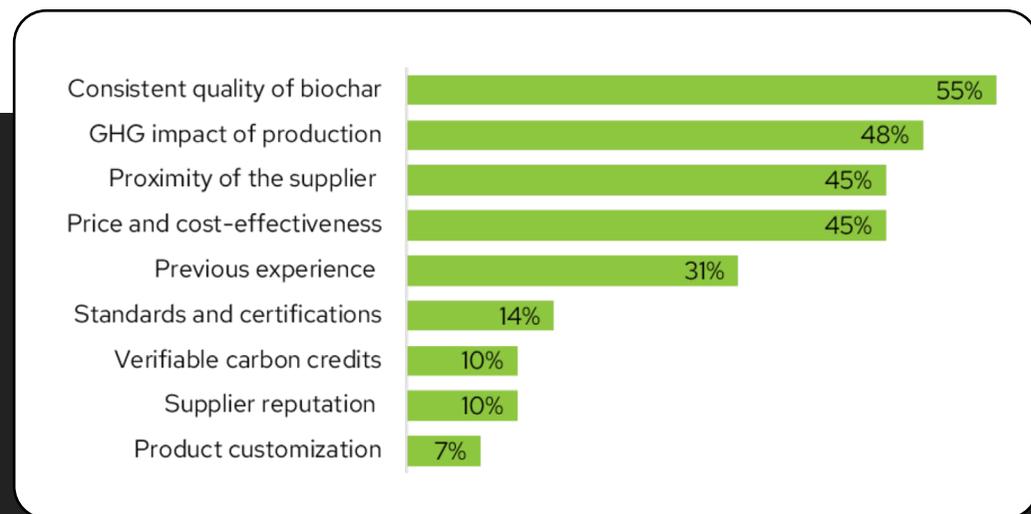
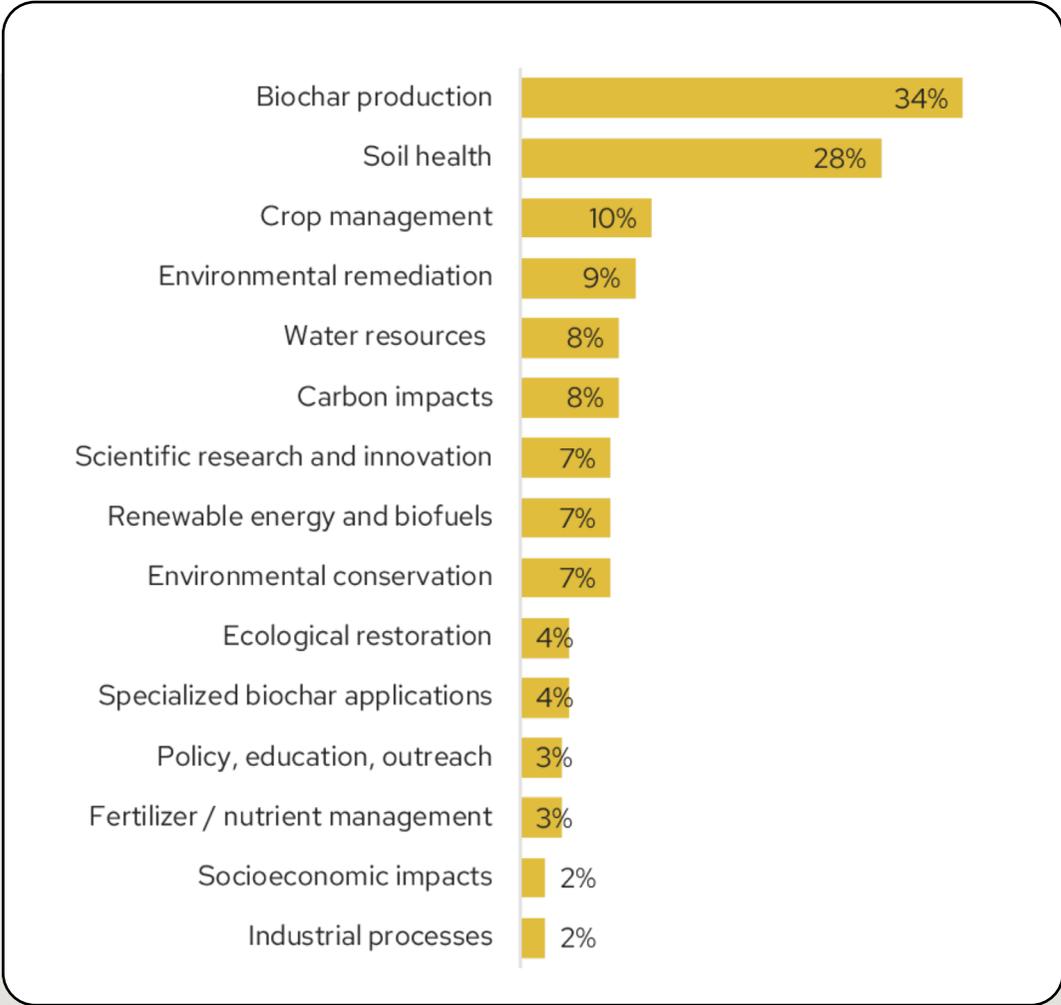


Figure 29. Key considerations among non-agricultural end-users when sourcing biochar when asked “What product specifications do you consider when sourcing biochar? (Please select up to top three)”.

ACADEMIC RESEARCHERS

Common Focus Areas



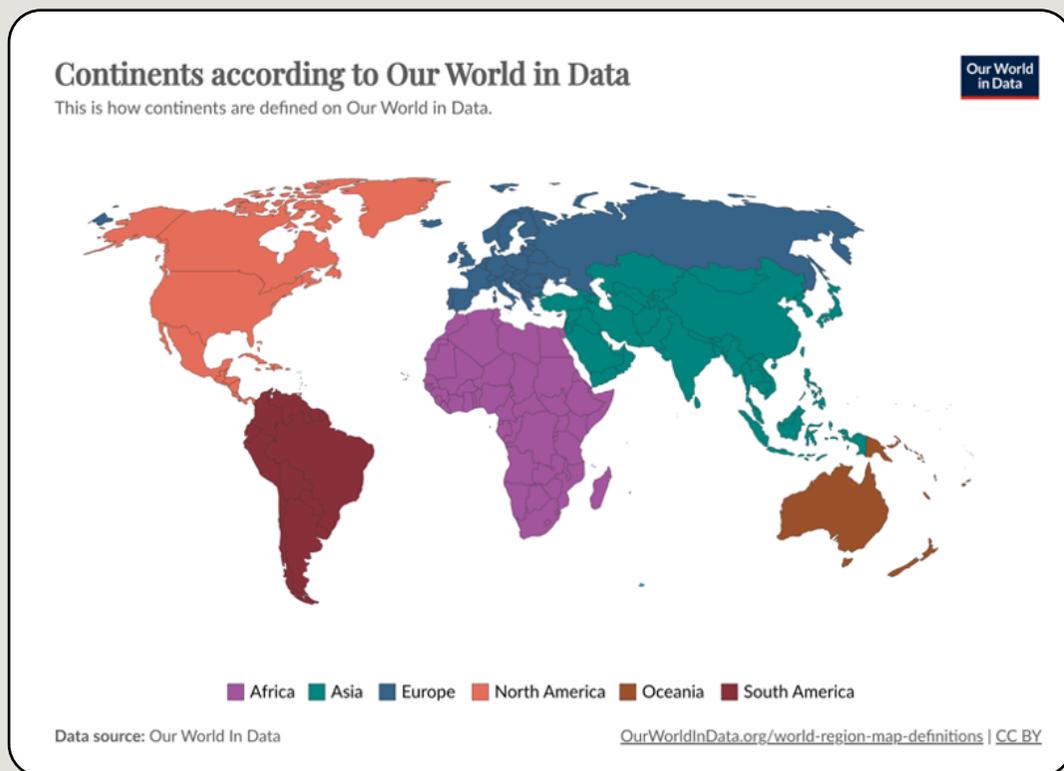
Working across a wide swath of research focus areas, these coalesced with many of the most reported end-uses of biochar, and also remind industry observers that biochar remains a heavily researched topic in general, with over 30,000 peer-reviewed published research articles to date.

Figure 30. Most common focus areas among researchers when asked “In what area of research are you working. (Please select best match)”.

Methodology

The 2023 Global Biochar Market Report was conducted using an anonymous web survey coupled with 11 in-depth interviews (IDIs) with subject matter experts from the biochar industry. Six IDIs were undertaken pre-survey and five post-survey to provide additional perspective and aid with survey design and interpretation of the results.

Respondents to the 2023 Global Biochar Market Report survey represented stakeholders from industry sub-sectors and came from 100 countries across the globe. For this report, we used the regions as defined by [“Our World in Data.”](#)



Industry respondents were invited to participate through direct emails provided by IBI and USBI, through social media postings by both organizations, and through other announcements. Other biochar-related organizations around the world further amplified these postings directly to their mailing lists and via social media, notably LinkedIn.

The survey was designed for completion within 10-15 minutes, with vital information collected early to accommodate potential drop-offs. Paths tailored to each stakeholder type streamlined the study and ensured that only relevant questions were asked of each respondent. The survey instrument was optimized for desktop and mobile browsers, and the survey was available in English, French, Spanish, and Chinese.

The survey was fielded from Nov 6 to Dec 5, 2023. In total, 1,007 responses were received - 830 were complete, plus 177 were substantially complete. The web survey, IDIs, and the resulting data were managed by Capasiti Consulting, a market research firm. Capasiti anonymized and regionalized all data prior to providing them to IBI and USBI so that the data could not be used to identify any specific respondents. IBI and USBI have retained these data only for the purpose of reporting them, and has implemented a strict data security protocol to ensure these data are not shared.

Limited data validation was completed by IBI and USBI on the anonymized data, primarily to remove several erroneous entries which reported very large biochar production rates greater than 100,000 mt per year using small scale production technologies. Biochar producers were asked to report the percent of their biochar production used for non-carbon preserving end-uses, such as for biocoal. These values were subtracted from the biochar production values reported by each producer, so reported biochar production values represent biochar that is sequestered.

The research was conducted by Capasiti Consulting Inc., and IBI and USBI staff members, Wendy Lu Maxwell-Barton, and Myles Gray, respectively, created the analysis and wrote the report. Lauren Boritzke Smith, IBI Communications Lead, led report design and compilation.



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2023

GLOBAL BIOCHAR MARKET REPORT