

Biochar at the Interface of Energy Transition and Regenerative Agriculture

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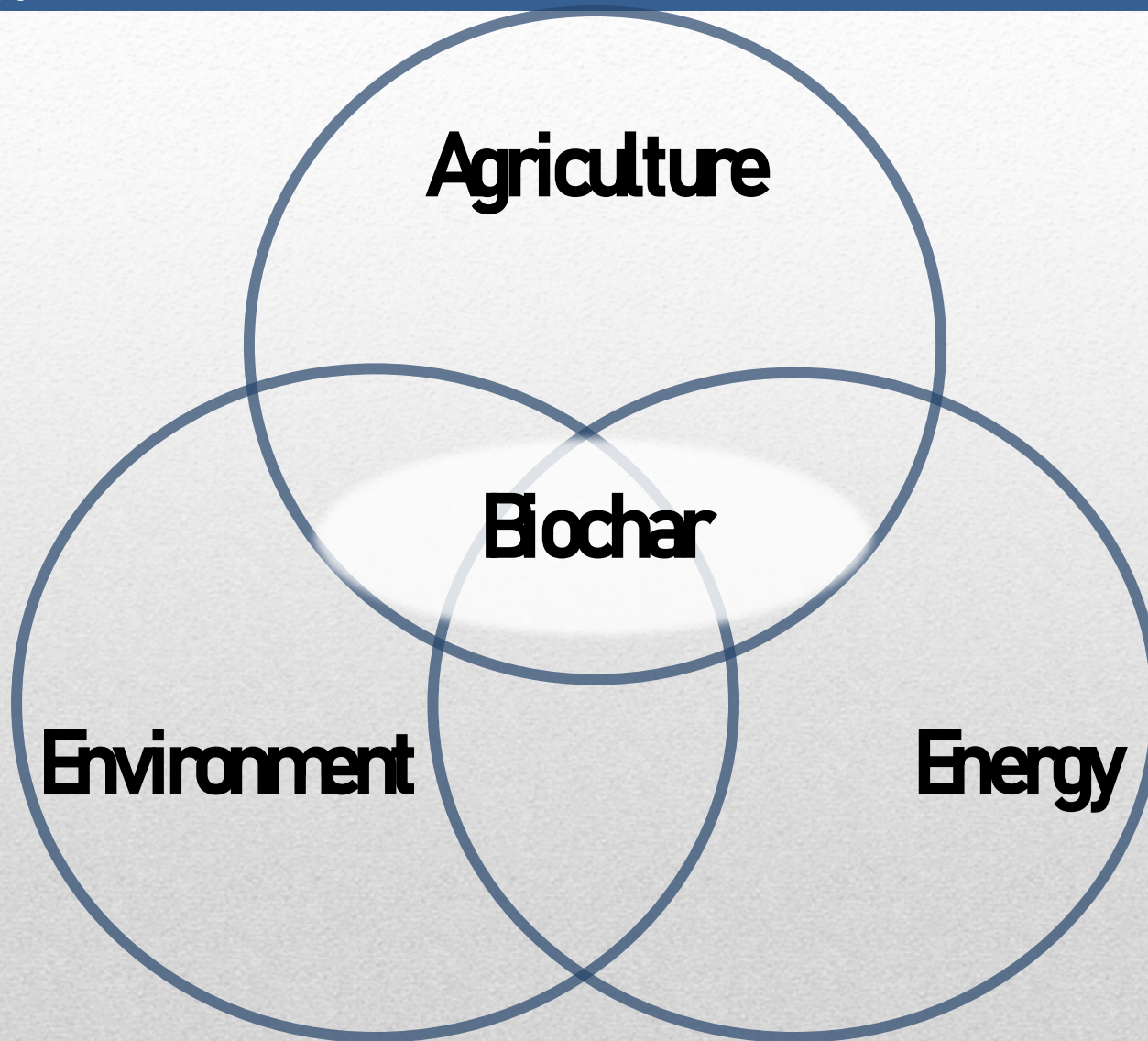
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Biochar At the Nexus of Agriculture, Environment, and Energy

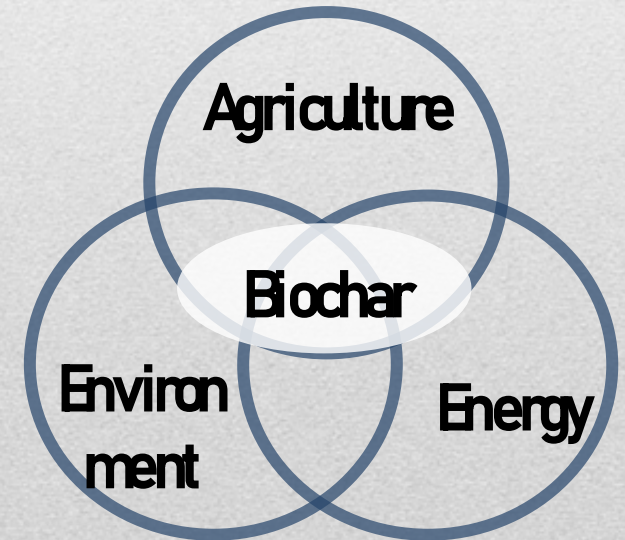
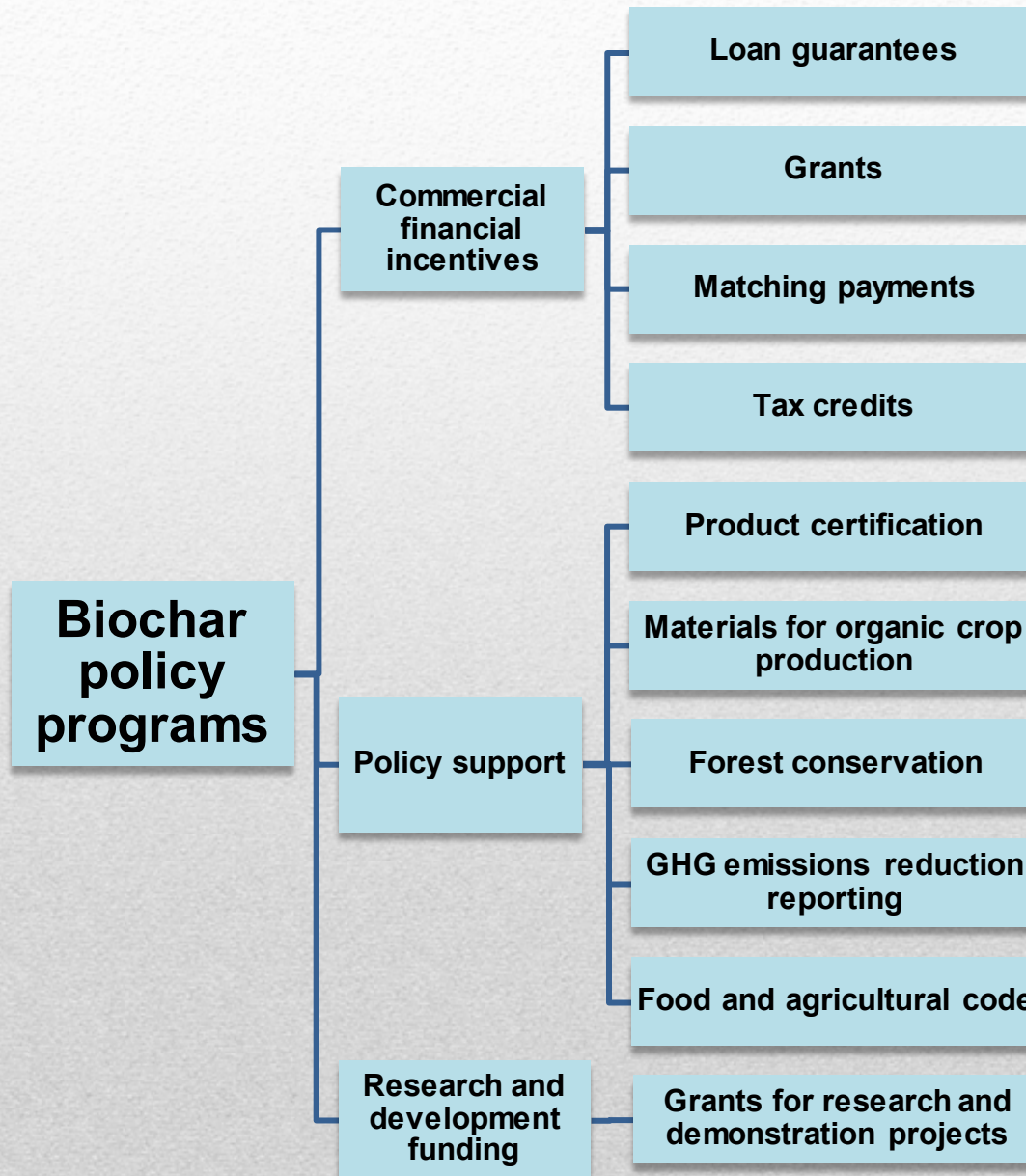


Challenges Remain

- Not yet widely adopted as a soil conservation practice
 - challenging capital requirements to bridge the gap between small-scale and commercial production
 - High costs make it hard to compete against conventional fertilizers
- Public policy heavily biased towards biofuels and bioenergy vs other bio-based materials
 - However, new programs and initiatives that support biochar development and application are increasingly being introduced.

→ **Multiple environmental benefits that are not fully recognized**

Policy Support for Biochar by Type



Current Policy Support for Biochar

Program Name	Agency	2022 Status	Policy Type	Biochar Eligibility	2022 Fund Size (million USD)
Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program	USDA	Ongoing	Commercial	Explicit	250
Advanced Biofuel Payment Program	USDA	Ongoing	Commercial	Implicit	NA
Biomass Crop Assistance Program Matching Payments (NOFA) (BCAP)	USDA	Ongoing	Commercial	Implicit	NA
BCAP Project Area Cost-Share	USDA	Ongoing	Commercial	Implicit	NA
BCAP Project Area Rental	USDA	Ongoing	Commercial	Implicit	NA
Rural Business Opportunity	USDA	Ongoing	Commercial	Implicit	NA
Biofuel Producer Program	USDA	Ongoing	Commercial	Implicit	700
BCAP Matching Payments	USDA	Ongoing	Commercial	Implicit	25
Value-Added Producer Grant (VAPG)	USDA	Ongoing	Commercial	Implicit	19.75
Rural Cooperative Development Grant Program (RCDG)	USDA	Ongoing	Commercial	Implicit	5.8
Small Socially Disadvantaged Producer Grant	USDA	Ongoing	Commercial	Implicit	3
Rural Economic Development Loans	USDA	Ongoing	Commercial	Implicit	1.5
Renewable Energy Systems (REAP)	USDA	Ongoing	Commercial	Implicit	0.5
Rural Energy for America Program (REAP)	USDA	Ongoing	Commercial	Implicit	0.1
Sun Grant Program	USDA	Ongoing	R&D	Explicit	2.7
Agriculture and Food Research Initiative Grant (AFRI)	USDA	Ongoing	R&D	Implicit	435
Biomass Research and Development Initiative Grant (BRDI)	DOE, IBCE, and USDA	Ongoing	R&D	Implicit	20
Conservation Innovation Grants	USDA	Ongoing	R&D	Implicit	20
Small Business Innovation Research Grants (SBIR)	DOE and USDA	Ongoing	R&D	Implicit	19.5
Small Business Grant	USDA	Ongoing	R&D	Implicit	12
Wood Innovations Grants	USDA	Ongoing	R&D	Implicit	8
Environmentally Preferable Purchasing Program	EPA	Ongoing	Support	Explicit	NA
National Organic Program	USDA	Ongoing	Support	Explicit	NA
Biopreferred Program	USDA	Ongoing	Support	Explicit	6
Conservation Stewardship Program	USDA	Ongoing	Support	Explicit	2.2
High Energy Cost Grant	USDA	Ongoing	Support	Implicit	NA

Potential Policy Support for Biochar

Legislations that passed the introduction phase

H.R.5376 - Build Back Better Act	Passed House	R&D
S.1251 - Growing Climate Solutions Act of 2021	Passed Senate	Commercial
H.R.3684 - Infrastructure Investment and Jobs Act	Became Law	Support

Potential legislations in 117th Congress (2021-2022) during the introduction phase

H.R.4504 - Tribal Biochar Promotion Act of 2021	Introduced	R&D
H.R.2581 - BIOCHAR Act of 2021	Introduced	R&D
H.R.2639 - Trillion Trees Act	Introduced	R&D
H.R.4614 - Resilient Federal Forests Act	Introduced	R&D
H.R.4334 - American Energy First Act (the biochar section is the same as the Biochar Act)	Introduced	R&D
S.2836 - America's Revegetation and Carbon Sequestration Act of 2021	Introduced	Commercial
H.R.2534 - Climate Stewardship Act of 2021	Introduced	Support
S.685 - America's Clean Future Fund Act	Introduced	Commercial

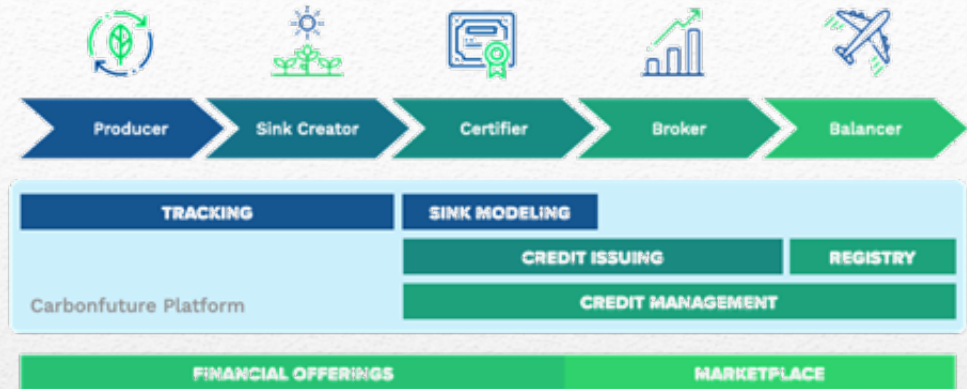
Discussions

- Potential legislations:
 - Increased attention to biochar as a soil amendment and carbon sequestration tool
- Existing programs:
 - Insufficient focus on incentives for biorefinery coproducts with various environmental benefits
 - Many programs are designed for already commercial-scale productions
 - Insufficient focus on soil security and soil carbon storage

Discussions

- Barriers for biochar to enter long-term policies:
 - Standards: High variability in biochar performance
 - Limited data on biochar performance, monetized benefits and production cost data
 - Limited or non-existent mechanisms or policy incentives that allow controlling and encouraging the reduction of non-point source pollution

Payments for Soil Carbon Sequestration



*CarbonFuture.earth

- Nature-based carbon sinks
 - Afforestation, soil organic carbon, biochar
- What is paid right now at the market?
 - ~\$30/acre/year to farmers (Indigo - Offsetting) - Up to \$50/acre from other grants
 - Is biochar accounted for? (CarbonFuture/Pacific Biochar¹)
- What studies say farmers should be paid for?
 - A \$40–80/Mg CO₂e compensation can allow for a 20% profit margin when corn-soy marginal lands are converted to switchgrass W corn-Soy².
- Are the financial incentives enough to persuade farmers to adopt the new practices?

¹ <https://pacificbiochar.com/first-biochar-carbon-credits/>

² Mishra et al., 2021, Environmental Science & Technology

Recommendations and Considerations

- Taking advantage of **existing programs** for biorefineries as a coproduct
- Soil security should be a national priority
- Monetizing the ecological benefits of biochar application can help including biochar in policy discussions
- Greater number of targeted programs to biorefinery products with **multiple environmental benefits**
- Continuous improvement in carbon accounting modeling to track carbon through different mediums and various temporal boundaries
- Higher payments by carbon emitters

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