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Biochar Protocol v1.0

Workgroup Meeting 5
April 25, 2023

Housekeeping

- Workgroup members have the opportunity to actively participate throughout the meeting
 - Ask that you keep yourselves muted unless / until would like to speak
- We will ask and take questions throughout the session
- All other attendees/observers are in listen-only mode
- Observers are free to submit questions in the Zoom Q&A dialog
- We will follow up via email to answer any questions not addressed during the meeting
- The slides and a recording of the presentation will be posted online

To provide overview of draft protocol components and solicit workgroup feedback

Discussion topics

Tuesday

- Project developer definition
- Feedstock eligibility
- Production technology eligibility
- End use eligibility, including permanence

Wednesday

- Crediting period, reporting periods, and verification cycle
- Chain of custody tracking
- Data collection
- Sampling
- Low volume projects

Reserve Staff:

- Jon Remucal, Associate Director of Nature-Based Solutions
 - Protocol development lead
- Holly Davison, Associate Director of Programs & Marissa Spence, Forestry Manager
 - Protocol development support

External drafting support:

- John Nickerson, Dogwood Springs Forestry

Workgroup Members

Name (alphabetical)	Organization	Name (alphabetical)	Organization
Akio Enders	International Biochar Initiative	Matt Ramlow	World Resources Institute
Allison Flynn	Global Green Energy Solutions Corporation	Melissa Leung	GECA Environment
Bruce Springsteen	Placer County Air Pollution Control District	Micah Elias	Blue Forest / UC - Berkeley
Daniel Sanchez	University of California – Berkeley / Carbon Direct	Nate Anderson	US Forest Service
David Morell	Sonoma Ecology Center	Patricio Ortiz	ACT Commodities
Hannes Etter	South Pole Carbon Asset	Phil Saksa	Blue Forest
Johannes Lehmann	Cornell University	Rachel Rubin	Woodwell Climate Research Center*
Jonah Levine	Biochar Solutions	Shawn McMahon	Aster Global
Josiah Hunt	Pacific Biochar	Tristan Brown	SUNY College of Environmental Science & Forestry
J.P. Bayangos	Shell	Xiaomei Li	Viresco Solutions
Kevin Fingerman	Cal Poly Humboldt		

Funding support



**U.S. Forest Service
Wood Innovations Program**



**CAL FIRE
Forest Health Grant**

Funding also supporting:

- Companion market analysis by Blue Forest Conservation (with additional funding support from the Doris Duke Charitable Foundation), **available on the Biochar Protocol webpage**
- Pilot projects to test protocol and demonstrate its viability and versatility



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PROTOCOL DISCUSSION TOPICS

Questions to Consider for All Discussions

Have we sufficiently addressed conditions for projects in Canada?

Are protocol requirements feasible for small producers, in-field operations, and aggregated projects?

Project Developer

Project developer is entity that:

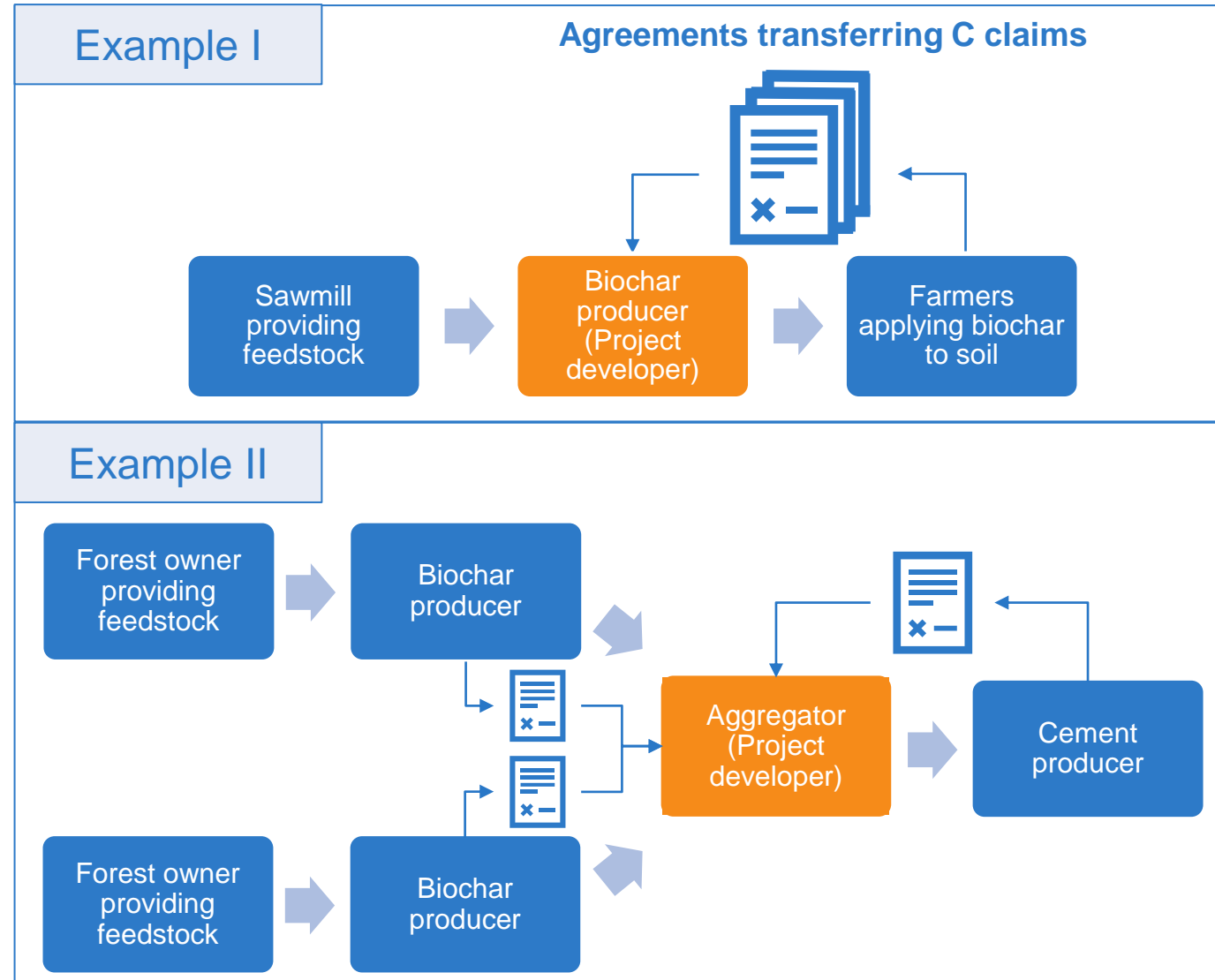
- Has an account with the Reserve
- Submits the project
- Responsible for project reporting and verification
- Is issued the credits

Project developer is assumed to be:

- End user, i.e., the entity/person providing for the long-term stability of the C in the biochar

BUT others may be project developer if able to secure agreement with end user(s)/others with claim to C

- Biochar producer
- Aggregator



Feedstock Eligibility

Eligible feedstocks specified in Eligible Biochar Feedstocks List

- Maintained separately from protocol
- Updated as needed and review regularly
- Identifies eligible feedstock categories, environmental safeguards, and assumed business as usual fate of biomass

Focus is on:

- Waste and by-product biomass sources (i.e., typically have no or limited economic use)
- Purpose-grown biomass
 - From perennial, non-woody species that are either native species or sterile non-native species
 - Must meet other environmental safeguards

May not contain:

- >2% contaminants
- >10% diluents/dilutants

Eligible Feedstocks

Feedstock category	Eligible sources	Environmental safeguards
Agricultural waste	Harvest residues	Extent of removal does not lead to depletion of soil carbon or decline in soil productivity
	Orchard, vineyard, woody biomass prunings	Demonstration that activity is part of normal management cycle/operations
	Orchard/ vineyard renewal clearings	
	Fruit and vegetable residues, including nut shells	None
Animal husbandry	Animal manure	None
Aquaculture by-products	Plants/organisms growing as by-product of aquaculture operations (e.g., seaweed, waste algae, invasive plant species)	If invasive species, demonstration that species were not introduced to provide biochar feedstock
Biodigester waste	Fermentation residues	None

Eligible Feedstocks

Feedstock category	Eligible sources	Environmental safeguards
Food processing residues	By-products and waste from food processing operations (e.g., washing, cleaning, peeling)	Rate of residue per unit of food processed must not increase to provide biochar feedstocks
	Expired food	None
	Food service organic waste/residues (e.g., from restaurants)	
Forestry and wood processing	By-products and residues from harvesting or forest management activities, including biomass treated and/or removed during fuel reduction or pest management activities	Demonstration that feedstock is waste or by-product of operations.
	Non-merchantable post-disturbance woody biomass (e.g., pest infestation, wildfire, windthrow)	Material from in-forest biomass must be less than 10" diameter, excepting cases where the project developer can demonstrate that leaving such material onsite poses heightened fire, insect infestation, or human safety risks
	Waste and residues from management of woody vegetation associated with agroforestry and rangelands	Demonstration that activity is part of normal management cycle/operations
	By-products and residues from wood processing facilities (e.g., sawmill sawdust)	None

Eligible Feedstocks

Feedstock category	Eligible sources	Environmental safeguards
Purpose-grown biomass	Perennial, non-woody species	<ul style="list-style-type: none"> • Grown on marginally productive lands, based on identification of land by USDA NRCS or Agriculture and Agri-Food Canada as non-prime farmland. • Must be a native species or sterile hybrid if a non-native species. • Must not replace existing commodity crops. • Harvesting activities must involve minimal soil disturbance.
Sewage sludge	Biosolids	None*
Urban waste	Urban/rural green waste (e.g., prunings/cuttings, landscaping residues)	None*
	Construction/lumber waste	
	Wastepaper and cardboard	
	Biomass component of municipal solid waste	

Production Technology Eligibility

No specific production technology is required to be used so there is flexibility that allows new/emerging processes to be eligible

BUT currently specifically disallows torrefaction and hydrothermal carbonization

- Is this needed or can we simply rely on $H:C_{org}$ analysis to determine eligibility?

Eligible biochar applications specified in Eligible Biochar End Uses List

- Maintained separately from protocol
- Updated as needed and reviewed regularly
- Identifies eligible end use categories, environmental safeguards, and whether emissions from transportation of biochar to end use must be accounted for

Environmental safeguards tend to rely on material standards specified by laws/regulations applicable to each end use

End use eligibility also based on whether the long-term stability (i.e., permanence) of C sequestered in biochar can be reasonably estimated

- Permanence defined relative to 100 years
- Crediting of sequestered C is largely based on expected levels of recalcitrance or length of time sequestered if less than 100 years
- Permanence factor (P_{EU}) applied during quantification of C removals
 - If C in biochar is expected to remain sequestered for ≥ 100 years, then $P_{EU} = 100\%$
 - If expected to remain for < 100 years, P_{EU} reflects time-value of C remaining out of the atmosphere, e.g., end use known to have 50-year lifespan, but fate at end of life is uncertain, then $P_{EU} = 50\%$

Eligible End Uses

End use category	Eligible end uses	Environmental safeguards	Permanence factor (P_{EU})
Agricultural, horticultural, home gardening, and/or forestry applications	Direct soil amendment	<ul style="list-style-type: none"> Compliance with relevant soil amendment and compost regulatory requirements, including material composition, relevant to end use location. If standards for heavy metals and toxicants are not available for end use location in US, then standards from USDA NRCS Code 366 must be applied (compost standards apply when biochar is applied as a compost additive). 	<p>Equation using H:C_{org} value(s) and soil temperature-based coefficients from Woolf et al. 2021:</p> $P_{EU} = c_{hc} - m_{hc}(H/C_{org})$ <p>Standardized GIS layer to be provided by Reserve to determine mean annual soil temperature for end use location(s).</p>
	Agricultural water filtration, with eventual field application		
	Compost additive		
	Livestock/animal feed additive	Compliance with relevant regulatory requirements for end use location.	
	Animal bedding		
	Horticultural growth media		
Urban applications	Non-food/-feed soil applications, e.g., urban forestry, landscaping, green roofs	Compliance with soil amendment regulatory requirements for end use location	Same as agricultural applications

Eligible End Uses

End use category	Eligible end uses	Environmental safeguards	Permanence factor (P_{EU})
Constructed/ engineered materials	Cement additive	Compliance with relevant regulatory requirements for material contents for location where constructed/engineered material is produced	100%
	Gypsum additive		
	Mineral plaster additive		
	Clay additive		
	Asphalt additive (cold-mix applications only)	Compliance with relevant regulatory requirements for asphalt contents for location where asphalt is produced	20%*
	Wood polymer composites	Compliance with relevant regulatory requirements for wood polymer composite contents for location where composites are produced	30%*

*Based on low end of lifespan range for conventional application relative to 100 years

Eligible End Uses

End use category	Eligible end uses	Environmental safeguards	Permanence factor (P_{EU})
Environmental remediation/stabilization and wastewater sanitation	Soil remediation, stormwater management, erosion control, septic and transpiration trenches, effluent polishing	Compliance with relevant regulations for environmental remediation/stabilization and wastewater sanitation	Same as agricultural applications
Permanence storage structures	Landfill disposal, including as alternative daily cover	Compliance with relevant regulatory requirements for contents of materials disposed of in landfills (or as alternative daily cover, as applicable)	100%
	Spent oil/gas wells	Compliance with relevant regulations for spent oil/gas well retirement	
	Subsurface mine remediation	Compliance with relevant regulations for subsurface mine remediation	



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NEXT STEPS

Next Steps

- *Workgroup Meetings 6 (tomorrow) and 7 (Thursday) (tentative)*
 - Continue reviewing draft protocol
- Email us with any feedback on protocol, including topics discussed today
- **Submit comments/feedback by Friday, May 5**
- Reserve staff will make revisions to the protocol
- *Depending on revisions, may share another protocol draft with workgroup for written feedback only*

Key contacts

Protocol development lead:

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General inquiries:

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