



CLIMATE  
ACTION  
RESERVE

# Biochar Protocol v1.0

*End Uses and Permanence*

Workgroup Meeting 4  
December 15, 2022

# Housekeeping

- Workgroup members have the opportunity to actively participate throughout the meeting
  - Ask that you keep yourselves muted unless / until you 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

# Purpose

- Solicit feedback on the proposed approach for end use eligibility and permanence

## **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	Kevin Fingerman	Humboldt State University
Allison Flynn	Arq	Matt Ramlow	World Resources Institute
Bruce Springsteen	Placer County Air Pollution Control District	Melissa Leung	GECA Environment
Daniel Sanchez	University of California - Berkeley	Micah Elias	Blue Forest Conservation / UC - Berkeley
David Morell	Sonoma Ecology Center	Nate Anderson	US Forest Service
Hannes Etter	South Pole Carbon Asset	Patricio Ortiz	ACT Commodities
Jeff Cole	Royal Dutch Shell	Phil Saksa	Blue Forest Conservation
Johannes Lehmann	Cornell University	Rachel Rubin	Woodwell Climate Research Center*
Jonah Levine	Biochar Solutions	Shawn McMahon	Aster Global
Xiaomei Li	Viresco Solutions	Tristan Brown	SUNY College of Environmental Science & Forestry
Josiah Hunt	Pacific Biochar		

# 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), **now available on the Biochar Protocol webpage**
- Pilot projects to test protocol and demonstrate its viability and versatility

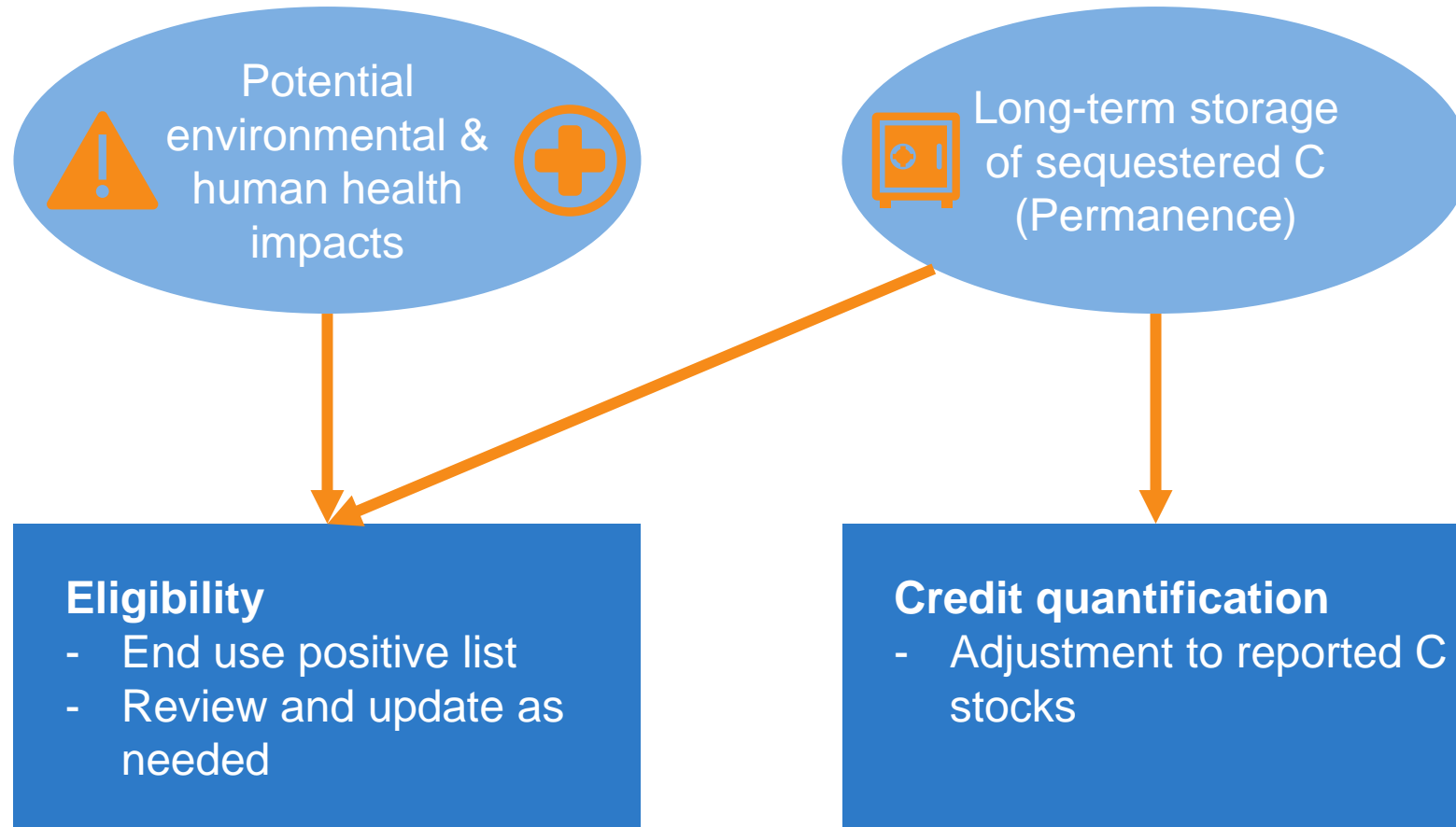


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# END USES AND PERMANENCE

# End Use Areas of Concern

End use: How biochar is applied/used in the near-term





# Environmental Safeguards and Eligibility

Category	Examples	Environmental Safeguard
Soil/Agricultural applications	Soil amendment	Soil amendment laws and regs
	Compost additive	IBI (minimum from range) or EBC-Agro materials standards, <b>except when biochar from forest feedstocks are re-applied on-site</b>
	<b>Litter additive</b>	
	Livestock feed additive	Relevant laws and regs EBC-Feed materials standards
Urban applications	Non-food/-feed soil applications	Relevant laws and regs IBI (minimum from range) or EBC-Urban materials standards
Construction/engineered materials	Asphalt additive, cement additive, plaster, wood polymer composites	Relevant laws and regs IBI or EBC-BasicMaterials
Permanent storage structures	Spent oil/gas wells, <b>others?</b>	Relevant laws and regs
Domestic uses	Deodorizer, water filtration, cosmetics, etc.	Not eligible owing to permanence uncertainty

# Environmental Safeguards

Maximum allowable limits to be eligible (from EBC v10.1 and IBI v2.1)

Parameter	EBC-Feed	EBC-Agro/-Urban	EBC-BasicMaterials	IBI (min. of range)	
H:C <sub>org</sub>	<0.7			<0.7	
16 EPA PAH (mg/kg)	Declaration	6 ±2.2 (Agro only)	n/a	6	
8 EFSA PAH (mg/kg)	1.0		4	n/a	
Benzo[e]pyrene Benzo[j]fluoranthene (mg/kg)	<1.0			n/a	
PCB (mg/kg)	ndl PCB = 10 µg TE/kg dl-PCB + PCDD/F = 1.25 ng-TEQ/kg	0.2		0.2	
PCDD/F (ng-TEQ/kg)	0.75	20		17	
Total trace & heavy metals (mg/kg)	Hg	0.1	1.0	Declaration	1
	Pb	10	120	Declaration	121
	Cd	0.8	1.5	Declaration	1.4
	Cu	70	100	Declaration	143
	Ni	25	50	Declaration	47
	Zn	200	400	Declaration	416
	Cr	70	90	Declaration	93
	As	2	13	Declaration	13
	Co	n/a			34
	Mo	n/a			5
Se	n/a			2	

Testing under a given standard performed by an accredited lab (EBC) or a lab capable of performing the required analyses (IBI)

# End Use Permanence

## Climate Action Reserve's permanence standard:



GHG benefits realized when C is permanently removed from the atmosphere



Permanent  $\geq$  100 years



Credit for C expected to be remaining after 100 years—must have reasonable assurances about long-term fate of biochar C

Permanence factor applied to reported biochar C amounts

For example:

% C maintained for $\geq$ 100yrs	Permanence factor ( $F_{perm}$ )	Credit basis for 100 tCO <sub>2</sub> e initially sequestered in biochar
100%	100%	100
80%	80%	80
50%	50%	50

# End Use Permanence

Category	Permanence Basis
Soil/agricultural & urban applications	<p>Temperature-based permanence factor for 100-year time frame from Woolf et al. 2021 based on lab analysis for H:C<sub>org</sub></p> $F_{\text{perm}} = c_{\text{hc}} - m_{\text{hc}}(\text{H:C}_{\text{org}})$ <p>Coefficients vary by mean annual soil temperature</p> <p>Applicable temperature based on standardized spatial soil temperature data and end use location reported from chain-of-custody tracking</p>
Construction/engineered materials	<p>Up to 100%, based on the percentage of C likely emitted prior to 100 years</p> <p>Dependent on post-life span fate of construction material and/or risk of combustion or other release of C</p>
Permanent storage structures	100%
Domestic/consumer products	Too uncertain to include (ineligible)



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# NEXT STEPS

# Next Steps

- **Email comments/feedback**
  - **Baseline approach by December 16 (tomorrow)**
  - **End use/permanence approach by December 23**
- Reserve staff to provide draft end-use positive list as soon as available
- Reach out any time to discuss protocol topics or process
- Protocol drafting by Reserve staff – *ongoing*
- *Goal is to provide full draft of protocol in January and reconvene to discuss*

# Key contacts

## **Protocol development lead:**

Jon Remucal, Associate Director of Nature-Based Solutions

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## **General inquiries:**

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