Eligible Biochar End Uses List [DRAFT]

All end uses for the application of biochar associated with a project must comply with relevant environmental laws and regulations, extending from the time immediately after the production of the biochar to the final application serving as the basis for long-term storage of the sequestered carbon and, hence, the permanence factor applied for credit quantification. Environmental and health requirements are specified in the table below for each eligible end use, including the materials standards that are applicable for end use applications in jurisdictions lacking heavy metal and toxicant standards for a given end use. Permanence factors applicable to each end use are also provided, as is an indication as to whether emissions associated with the transportation of biochar must be included in project emissions calculations.

<table>
<tr><th>End use categories</th><th>Eligible uses</th><th>Environmental safeguards, including default material standards</th><th>Permanence factor (P_{EU})</th><th>Biochar transportation emissions?</th></tr>
<tr><td rowspan="3">Agricultural, horticulture, home gardening, and/or forestry applications</td><td>Direct soil amendment</td><td rowspan="3">Compliance with soil amendment or compost regulatory requirements, including contaminant/chemical composition, relevant to the end use location. May not be derived from the following feedstock types:
- Municipal solid waste
- Construction and demolition waste

If standards for heavy metals and toxicants are not available for soil amendments or compost in the jurisdiction in which the biochar is applied, the standards specified as applicable to all soil amendments and to biochar by the USDA NRCS Conservation Practice Standard for Soil Carbon Amendment (Code 366) (United States only) must be applied for soil amendments. For biochar used as a compost additive, the additional standards for compost specified under Code 366 also apply.</td><td rowspan="3">$P_{EU} = c_{hc} - m_{hc}(H/C_{org})$

From Woolf et al. 2021

Value for H/C_{org} based on laboratory analysis performed for each biochar batch

Mean annual temperature spatial layer available on the Biochar Protocol webpage and is used to determine the applicable coefficients for c_{hc} and m_{hc}:

<table><tr><th>Mean annual temp (°C)</th><th>c_{hc}</th><th>m_{hc}</th></tr><tr><td>≤ 5</td><td>1.13</td><td>-0.46</td></tr><tr><td>5.1 – 10.0</td><td>1.10</td><td>-0.59</td></tr><tr><td>10.1 – 15.0</td><td>1.04</td><td>-0.64</td></tr><tr><td>15.1 – 20.0</td><td>1.01</td><td>-0.65</td></tr><tr><td>≥ 20.1</td><td>0.98</td><td>-0.66</td></tr></table></td><td rowspan="3">Included</td></tr>
<tr><td>~~Agricultural water filtration, with eventual field application~~</td></tr>
<tr><td>Compost additive</td></tr>
</table>

	Livestock/animal feed additive	Compliance with livestock/animal feed regulatory requirements relevant to the end use location.		
	Animal bedding	Compliance with animal bedding regulatory requirements relevant to the end use location.		
	Horticultural growth media	Compliance with horticultural growth media regulatory requirements relevant to the end use location.		
Construction/engineered materials	Cement additive	Compliance with laws and regulations for cement content	100%	Included
	Gypsum additive	Compliance with laws and regulations for gypsum wallboard content		
	Mineral plaster additive	Compliance with laws and regulations for plaster content		
	Clay additive	Compliance with laws and regulations for clay composites content		
	Asphalt additive (cold-mix applications to asphaltic mix only)	Compliance with laws and regulations for asphalt content	20% (Based on low end of lifespan range relative to 100 years, e.g., 20 years = 20%)	
	Wood polymer composites	Compliance with laws and regulations for wood polymer composites content	30% (Based on low end of lifespan range relative to 100 years)	
Environmental remediation/stabilization and wastewater sanitation	Soil remediation, stormwater management, erosion control, septic and transpiration trenches, effluent polishing	Compliance with relevant environmental laws and regulations for environmental remediation/stabilization and wastewater sanitation	Same as for agricultural applications, as indicated above	Included
Permanent storage structures	Spent oil/gas wells	Compliance with relevant environmental laws and regulations for oil and gas well retirement	100%, unless biochar was applied to an intermediate end use prior to application in	Included

	Subsurface mine remediation	Compliance with relevant environmental laws and regulations for subsurface mine remediation	a permanent storage structure. In such cases, the permanence factor for agricultural applications must be used.	
	Landfill disposal, including as alternative daily cover	Compliance with relevant environmental laws and regulations for contents of materials disposed of in landfills (or as alternative daily cover, as applicable)		
Urban applications	Non-food/-feed soil applications, e.g., urban trees and/or landscaping, green roofs	Compliance with soil amendment regulatory requirements relevant to end use location	Same as for agricultural applications, as indicated above	Included