

FACT SHEET: Carbon Market Investment Criteria for Biochar Projects

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In a report for the West Coast Regional Carbon Sequestration Partnership, The Climate Trust assessed the appropriateness of biochar as a terrestrial carbon sequestration offset project. The report, titled “Carbon Market Investment Criteria for Biochar Projects,” describes what types of biochar projects can readily qualify as high-quality greenhouse gas offsets.

Background on biochar

Heating organic material without oxygen in a process called pyrolysis thermo-chemically transforms biomass into a stable charcoal residue that resists decomposition. This residue is called biochar when it is incorporated into soils as an agricultural amendment. Biochar reduces greenhouse gas emissions by sequestering carbon in inert charcoal that decomposes much more slowly than the original feedstock used to make the charcoal. The report estimates that one metric ton of biochar sequesters 2.35 metric tons of carbon dioxide.¹ Pyrolysis also produces oils and gasses that can be combusted to make renewable energy.



Waste woody biomass is turned into biochar (pictured on the right) through pyrolysis in a Pyrolytic Retort (pictured on the left) at the TSY-Peak Thompson Timber Mill Biochar Project in Philomath, Oregon. The report features a case study of this project’s technology, greenhouse gas emissions and potential to generate carbon offsets.

Given these and other pathways for reducing emissions, at its maximum sustainable potential, biochar could annually reduce 1.8 gigatons of carbon dioxide equivalent emissions (CO₂e) or 12% of the world’s GHG emissions.

¹ Based on the assumption that one metric ton of biochar contains 0.8 metric tons of carbon and 80% of this carbon will remain sequestered in the biochar after 100 years

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Carbon Market Investment Criteria

This report finds that for a project to qualify as a high quality offset, it should contain the qualities described in the table below.

Project component	Desirable quality	Carbon market rationale
Feedstock	Projects are fed by waste biomass that would otherwise be burnt or left to decompose. Feedstocks grown specifically for the biochar project are produced on marginal or degraded land.	<i>Leakage.</i> If the feedstock used by a biochar project has alternate uses, the project could cause increased harvest of feedstocks outside of the project boundary or deforestation of new land to grow new feedstocks. Waste feedstocks do not cause this land-use change, whose greenhouse gas emissions are potentially very large and difficult to accurately account for.
Pyrolysis process	Pyrolysis will generate at least 25,000 metric tons of biochar over ten years. Bigger projects (100,000 metric tons of biochar or more) are the most desirable.	<i>Verification.</i> Because many verification costs are fixed regardless of the size of the project, verification costs are a smaller portion of the overall cost of large projects. Economies of scale favor large projects. Projects that produce less than 25,000 metric tons of biochar over their life will not be considered for carbon market investment unless a small-scale methodology and aggregation system is developed to reduce transaction costs.
Use of biochar	The biochar producer can account for, track and monitor where all the biochar is incorporated into soils. Vertical integration, where the producer of the char is also the user of the char, is the most desirable.	<i>Monitoring and Permanence.</i> Steven De Gryze’s “Evaluation of the Opportunities for Generating Carbon Offsets from Soil Sequestration of Biochar” suggest the most credible method to quantify biochar projects is to measure the quantity of biochar remaining in the soil 1, 5, 10, 20 and 50 years after it is incorporated into the soil. Vertical integration makes this monitoring economically feasible. If projects are not vertically integrated, they must at least be able to easily track and account for where all the biochar produced is integrated into soils.

As the biochar industry matures and starts producing at scale, projects are likely to be eligible to sell their climate benefits as GHG offsets to regulated emitters under a cap-and-trade program. This makes biochar a promising project type for pilot-scale investment and carbon market protocol development. A protocol to qualify and quantify the carbon offsets generated by biochar projects will enable the industry to scale up and focus on maximizing the potential climate benefits of biomass utilization.