BIOFORCETECH CORPORATION

Biomass to Biochar Feasibility Study



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Pistachio Shells



Pistachio Shell Biochar - 650°C, 15 min

Overview

Biochar has been noted by the IPCC as a material with the potential to eventually remove 2.6 billion tonnes CO2 per year. While numerous biomass materials can be utilized to create biochar, a small handful are being produced at scale largely limited to woody biomass and agricultural shells/hulls. In order to expand production of biochar, biomass producers must know if they can feasibly create the material at all.

Bioforcetech is pleased to provide a standardized feasibility study and report for biomass producers to evaluate their product for biochar production through a Bioforcetech system and to understand the basic values and characteristics of the resulting material.

Utilizing a Bioforcetech bench scale pyrolysis unit, a sample of demonstrative biomass will be processed at a standard temperature and residence time to produce a biochar. This biochar will then be analyzed and characterized with a focus on elemental composition, carbon content, and carbon permanence. Once produced and analyzed, a small sample of the biochar will be sent to the biomass provider, and a report will be compiled of the study including the results of the analyses and a determination of the biomass' ability to be processed through a Bioforcetech system.

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Process and Timeline

Stage 1: Sample Feasibility

Once received, a biomass that meets the requirements for conversion will be inspected and its ability to be conveyed through the pyrolysis unit will be determined. Upon receiving the biomass, a small sample will be sent to our lab for analysis to determine feasibility for a successful thermal conversion to biochar. If a material cannot be conveyed in its received state, further processing within reason will be done by Bioforcetech personnel at an added cost to the provider while awaiting results from the analysis. Once the material has reached a conveyable state and the results of analysis show feasibility for successful conversion, the testing can begin.

Stage 2: Biomass Conversion

During stage 2 the biomass is conveyed through the Bioforcetech bench scale system to be converted into a fixed carbon biochar. Like the full scale Bioforcetech system, this bench scale unit can control temperature and residence time +/- 1°C and to the second respectively. The airtight reactor ensures no extra oxygen reaches the material, and our oxidizing chamber ensures hydrocarbons are removed and spent so as not to condense onto the resulting biochar.

Stage 3: Analysis

The biochar sample is analyzed and characterized by a trusted third party laboratory. Basic yet thorough characterization of the material will be completed to give an accurate picture of how this biochar compares to others. Characteristics include carbon content, carbon permanence through H:C ratio, biomass to biochar yield, ph, surface area, and more.

Stage 4: Results and Reporting

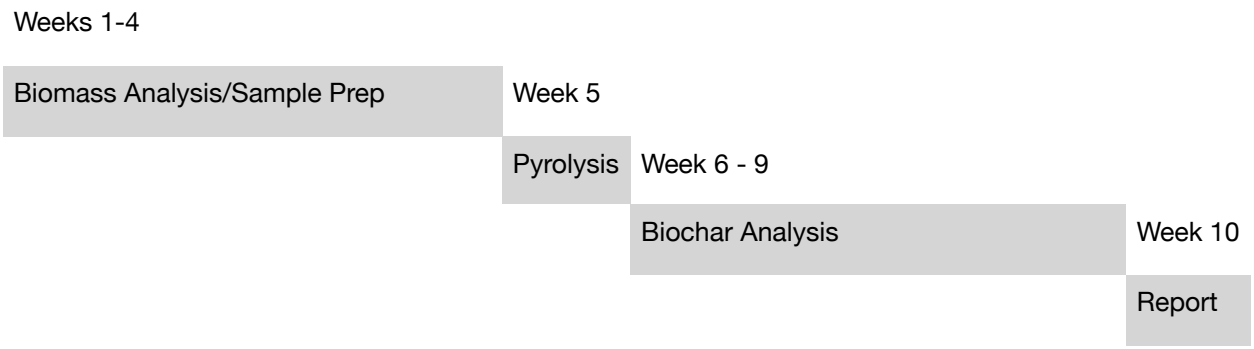
Once analyzed, a written report of the study will be shared with the biomass provider. More than pure data, this report includes a detailed review of the work done, notes on the physical and chemical analyses completed, and conclusions on the general feasibility of this material to produce a biochar at scale through a Bioforcetech system.

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Timeline

Assuming no further processing is required to convert the biomass, that there is no delay at our lab or partner labs for analyses, and that the biomass is immediately able to move into production, Bioforcetech estimates results reported in 8 to 10 weeks.

Feasibility Study Timeline



Biomass Requirements

In order to ensure quality and consistency during the feasibility study, a biomass sample must meet certain parameters. While some of the parameters listed below are the same for processing on a full scale Bioforcetech pyrolysis unit, a number of them are due to the conveyance requirements and size of the bench scale unit. To that end, processing required to procure a sample for a feasibility study may not be required for conveyance in a full scale BFT pyrolysis unit.

Biomass Requirements

Sample Size	6 dry kilograms
Particle Size Distribution	2-8 mm in all directions
Moisture Content	< 20%
Consistency	Homogenous
BTU	> 5,000 btu/lb

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Pricing

The pricing for a Biomass to Biochar feasibility study is as follows in the below table. Note that this is a complete study separate from a biomass feasibility study with PFAS removal testing, which Bioforcetech also offers. The biochar created in this study cannot be analyzed for PFAS destruction due to the differing SOPs associated with production for each of these studies.

Biomass Feasibility Study Pricing

Testing Type	Sample 1	Sample 2+
Biomass Feasibility Study	$7,000	$5,500*

**Assuming subsequent samples are submitted at time of first sample study or no later than 90 days after receiving results from the first study.*



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