BIOCHAR AND CARBON FACILITY
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Summary

The drawdown of CO_2 from the atmosphere to assist in the stabilization of the Earth's climate system can be accomplished by the thermal conversion (pyrolysis) of waste wood mixed with animal manures to create a persistent solid form of Carbon or what is commonly called Biochar. The volatile gases generated from this process is know as Synthesis gas (syngas) and can be used to generate heat for steam and electrical energy generation or conditioned into a biofuel.

Published studies and analysis have been shown that Biochar can sequester more Carbon than it emits therefore, it is Carbon Negative. Quantifying the amount of Carbon sequestered per ton of Biochar commonly follows ISO guidelines in the determination of the worthiness to generate a Carbon Credit therefore, verifying the amount of carbon credits produced is commonly quantified as; CO2 equivalent per metric ton of the biomass. The certification process requires a Life-Cycle-Assessment (LCA) to quantify the number of tons of CO_2 equivalent there by estimating the climate change impacts of the raw materials before pyrolysis, the amount of electrical energy require to produce the Biochar, and analysis of the finished product.

This transparent methodology also tracks and records emission data from the outlet of all processing equipment and the electrical power usage so that the amount of $CO_{2\ used}$ in the production process can be subtracted. Electrical generation produced from the syngas off-sets electrical energy purchased.

Based on research the total carbon abatement is expected to be 0.7-1.3 metric tons of CO_2 equivalent per metric ton of waste biomass. Since manure generates methine and will be mixed with waste wood to create the feedstock, the carbon abatement will increase significantly. It is important to note that the U.S. Greenhouse Gas Emissions Inventory and Sinks: 1990-2019 estimates of CH4 emissions from manure management in 2019 as 62.4 MMT CO_2 Eq.

The project described as follows will demonstrate the technical and economic viability of large-scale production of Biochar and high-grade activated carbon (AC) utilizing a mixture of local waste wood from a local sawmill with chicken, cow, or swine manures available in the local area. The project will integrate existing and new biomass/manure thermal conditioning technology to create a consistent feedstock with known attributes as a feedstock to the pyrolysis systems at a capacity of over 1250 Lbs./hr. of raw material and create approximately 6,000,000 Lbs./yr. of Biochar and also generate heat energy for steam generation for process requirements of activated carbon. This program will demonstrate commercial scale:

- Dewatering Manure
- Raw Material Mixing
- Drying the feedstock with waste heat

- Large and small pyrolysis reactors with continuous fuel feeding systems that will maintain an oxygen free environment prior to, in, and after the pyrolysis reactor. (The smaller reactor will utilize the Teragoto reactor now in storage.)
- Integration and retrofit of an existing biomass boiler with a large pyrolysis reactor to generate heat energy and steam
- Possible integration and retrofit of an existing diesel electrical generation with a pyrolysis reactors and candle filters to generate electrical power and waste heat
- Efficient separation of the post reactor solids and gaseous streams
- Control combustor heat production to supply the pyrolysis reactors the required heat energy.
- Syngas burner for air and pyrolysis gas delivery, and tangential air and flue gas mixing withing a boiler/combustor.

The viability of the project is that it combines the above elements into a single process and integrates the existing equipment for the production of Biochar, heat, and power at a competitive price and the sequestration of Carbon, while creating meaningful employment in a rural economy, and lowering the cost of soil conditioning and fertilizers.

Note: It is important to note that knowhow and equipment associated with this project can be is repeated throughout the U.S. due to closure of existing large biomass power plants that no longer can compete in the electrical energy generated market due to the low cost generation from natural gas turbines.