



The Pyrolysis-Biochar Bioenergy Pathway for Agriculture

Pyrolysis is a form of controlled combustion of biomass in low oxygen conditions. It yields bioenergy in the form of syngas and bio-oil. It also yields a soil amendment coproduct, biochar, with remarkable carbon sequestration properties of indefinitely long duration. In other words, this is a bioenergy pathway which utilizes biomass in a manner which not only produces energy, but simultaneously produces the coproduct biochar which enhances soil quality and agricultural yields. Moreover, this pathway concurrently sequesters large quantities of carbon in a manner expected to earn valuable carbon offset credits.

The pyrolysis platform is relatively low-tech and appears deployable on a distributed-scale basis independent of large centrally located plants. The pyrolysis process will accommodate a large range of biomass feedstocks and seems most readily deployable for sources of underutilized biomass such as stover or forestry residuals.

There are many variables at play in developing a successful pathway implementation. Some such variables include the selection of the correct location, the appropriate scale, and the right pyrolysis technology. Depending on the source of biomass and the intended use of the outputs, including knowledge of the soil type and agricultural land, a project must select the proper technology. Additionally, a tradeoff must be made along the available continuum between maximizing the volume of fuel outputs or maximizing the volume of biochar output.

Summarizing this high-cut overview, the pyrolysis-biochar bioenergy pathway:

- Works on a distributed basis.
- Utilizes available sources of residual biomass.
- Produces an agricultural soil amendment.
- Sequesters biochar carbon in soils for extended terms.
- Depends upon, for economic viability:
 - A low-cost source of biomass.
 - Agricultural land for beneficial use of the biochar as a soil amendment.
 - Carbon market offset credit revenues.
 - An emerging generation of optimized pyrolysis technology.
 - A local use for the unrefined bio-oil in industrial boilers or similar combustion environments.
- Necessitates an integrated approach optimizing its outputs (bioenergy, carbon sequestration, soil enhancements) for local project conditions.

While pyrolysis-biochar projects are still in their infancy, this is an emerging opportunity with unusual potential to be a truly carbon negative source of renewable energy with the valuable carbon offsets and soil amendment coproducts.

Quality sources of additional information include:

- <http://www.biochar-international.org/>
- <http://www.biochar-us.org/>

For additional information, contact 25x'25 at info@25x25.org.