

Problem

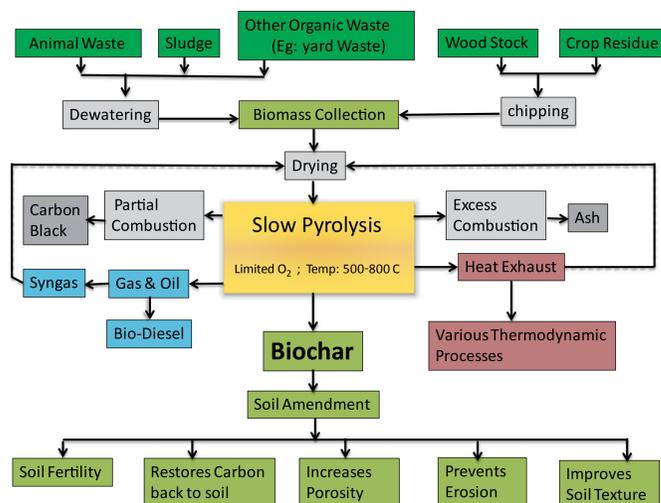
The outsourcing of manufacturing jobs and the increased urbanization of the service sector has seriously harmed small towns across the USA. To Determine Prospects of Making Positive Impacts on Sustainable Economic Development, Creation of Business Opportunities, and Jobs in Small Towns of America via Development of Sustainable Organic Waste Management Strategies: The Case of Biochar System Design for Town of Orange.

Project Focus



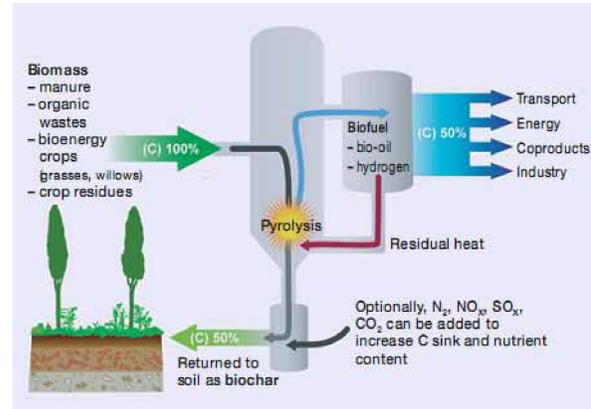
- Pursue a pilot project for the conversion of local farm waste and municipal sludge to saleable products such as Biochar.
- Gather information and characterize the type, quality and quantity of organic solid waste generated in Orange, MA.
- Examine and compare biochar to other technologies.
- Develop a business case for the proposed technology, including costs, benefits, risks, potential market, and likelihood for economic growth in Orange.

Process Flow



What is Biochar?

A soil amendment that combats Global Warming and improves agricultural sustainability and environmental impacts.



Raw Materials



Uses

- Excellent soil amendment, prevents nutrient run-off erosion.
- Gets rid of organic waste like manure, corn, husk, wood chips etc.
- Reduces the use of nitrogen fertilizers which are harmful to aquatic organism.
- Sequester carbon in the soil.
- Byproducts include biofuel (can be refined and sold) and syngas (fuels the process)



Centralized design

- \$50,000 and up
- Waste are processed at a central location.
- Recovers biochar and biofuel can be processed and sold.
- Can also generate heat and electricity
- Can bank and sell carbon credits



Decentralized design

- \$200-\$500
- Household units
- Produces mainly biochar
- Functions as a stove and grill
- Use based on personal need



Business case

Centralized System

Cost Parameters	Benefit	Business and Operational Impact	Constraint
<ul style="list-style-type: none"> ■ Capital Costs ■ Pyrolyzer ■ Land ■ Building ■ Generator/Turbine ■ Transportation Costs ■ Installation Labor ■ Operational Costs ■ Dewatering Sludge ■ Packing Biochar ■ Cost of Marketing ■ Insurance ■ Taxes ■ Accountant ■ Legal Fees ■ Labor ■ Cost of Training ■ Interest Payments ■ Depreciation 	<ul style="list-style-type: none"> ■ Sale of: ■ Biochar ■ Electricity from burning bio-oil ■ Tipping Fees ■ Reduced Energy Costs ■ Carbon Dioxide Offsets 	<ul style="list-style-type: none"> ■ Jobs ■ Waste Management ■ Sustainable Energy ■ Generate Income for Orange ■ Carbon Sequestration 	<ul style="list-style-type: none"> ■ Government Regulations ■ Safety Issues ■ Cost of Carbon Credits ■ Market Size ■ Competition from where they currently send waste

Decentralized System

Cost Parameters	Benefit	Business and Operational Impact	Constraint
<ul style="list-style-type: none"> ■ Cost of Capital ■ Fuel to start reaction 	<ul style="list-style-type: none"> ■ Decrease costs of transportation ■ No tipping fees 	<ul style="list-style-type: none"> ■ Waste Management 	

Future Work

- More detailed Cost-Benefit Analysis
- Determine if Biochar is profitable
- Qualitative Analysis of Biochar

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