Business Case (cont'd)

Decentralized System:

Pros:

- Simple
- Accessible to almost anyone

QuickTime™ and a
decompressor
are needed to see this picture.

Cons:

- Inefficient
- Cannot be used to make a profit

Challenges

- Difficulty acquiring a pyrolysis unit
- Quality and availability of information
  - Reliability of internet sources
  - Little precedent in real world solutions like this

Recommendations:

For the town of Orange, the major problem is that their municipal waste, or sludge, contains too much water for it to be pyrolyzed. Future research would need to be conducted on the possibility of dewatering the sludge in an efficient matter so that a profit can still be made from the biochar produced.
The production of biochar could be an invaluable part of the world's move toward green technology. With further research and funding, this technology could be incredibly beneficial to small towns like Orange.

Conclusions:

Although there has been research done on biochar, it is rarely used today. By conducting further research on the methodology of producing biochar and its byproducts in the most efficient manner, small towns across the world would be able to have an economic, sustainable waste management system.

Contact Information

SEED Initiative

-Website: http://www.stuartseed.org/SEED/SEED.html

Project Managers

-Remi Adejinle(radejinl@iit.edu)

-Gokul Butail(gbutail@iit.edu)

-Brandon Lee(blee21@iit.edu)

IPRO It takes a team! INTERPROFESSIONAL PROJECTS PROGRAM

IPRO 350

Small Town Sustainable Economic Development

Team Members:
Remi Adejinle
Gokul Butail
Samantha Cosenza
Tillmann De Graaff
Takahiro Futugami
Benjamin Hinshaw
Asfandyar Khan
Catherine Latour
Brandon Lee
Dashiell Stewart
YaNi Wang

Faculty Advisors:
Nasrin Khalili
Jim Braband

Team Purpose

The purpose of the team is to design a model of a sustainable waste management system for the town of Orange, Massachusetts. We seek to foster the economic attractiveness and vitality of the town by designing a better and more sustainable way to manage the town's waste.

Objectives

- Design a model of a sustainable organic waste management system for rural areas
- Develop a business case for Orange, Massachusetts
    - Compare modular units and centralized facilities
    - Evaluate economic impact of the designed system

Orange, MA

Orange, Massachusetts has all of the social, technical and resource-based elements to foster a green economy: extensive waterways, productive woodlands, substantial organic farm works and a resilient work force whose machinist roots dates back two centuries. Using these assets as a foundation, the town has chosen to pursue a sustainable, environmentally informed development.

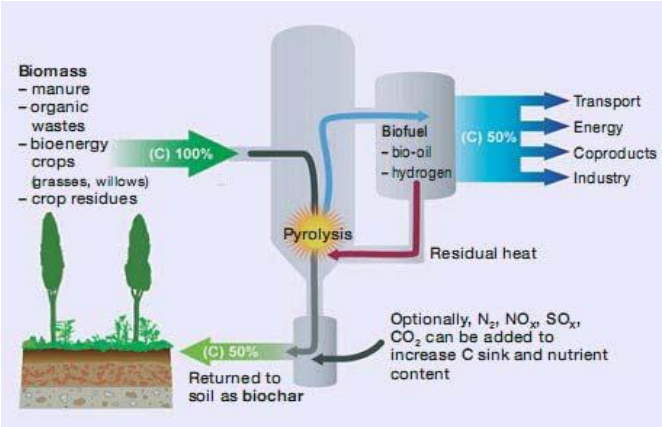
Biochar

What is it?

Biochar is a fine-grained, porous charcoal substance that, when used as a soil amendment, can remove carbon dioxide from the atmosphere and improve soil fertility

How is it made?

Biochar is produced using pyrolysis, in which biomass is burned in the absence of oxygen.



Uses:

Biochar is an excellent soil amendment, and it prevents nutrient runoff and erosion in the soil. It is produced by burning organic waste like manure and sewage sludge, and thus reduces pollution. Biochar also sequesters carbon in the soil. During pyrolysis, other helpful, carbon-negative byproducts are produced, such as biofuel, which can be refined and sold, and syngas, which can be reused in pyrolysis.

Business Case

Centralized System:

Pros:

- Larger quantities of waste can be processed and more biochar can be produced
- Possible government funding

Cons:

- Expensive
- The waste from Orange is largely liquid and cannot be processed without being treated