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Introduction

This type of project is designed to avoid the traditional system of dumpsters and hauling of foodwaste, grass, leaves, and incidental soiled paper (called Source Separated Organics (SSO)) by converting it into biogas and liquid plant food onsite. The biogas is a form of natural gas that can be used as renewable natural gas or can be converted to electricity and heat on the premises. The anaerobic digester (AD) system we are proposing uses naturally occurring bacteria in a closed anaerobic digestion system to make both biogas and valuable liquid plant food from the remaining organic matter.

Impact Bioenergy is a North American leader in bringing this type of technology to the campus scale in an urban setting. We founded the company because we became aware the technology was well proven but not available at this scale. Yet with rising transport and processing costs and our new urban conversion systems and methods we can now economically deliver this at a scale that fits this property. This will demonstrate a completely new innovation in organics material conversion. We call this life cycle:

Food to Renewable Energy & Fertilizer & Soil Improvement to Food Again.

This life cycle enables much lower energy consumption overall, less traffic intensity in the city, and retention of employment and commerce (dollars) in the community.

The state of the art for anaerobic digestion can be seen in several commercial sectors in North America, but in the past none of these were designed to serve the urban commercial food and paper organics sector. By a recent survey, in the United States there are 192 farm-based biomethane systems, 1,238 wastewater biomethane systems, and 594 landfill-based biogas systems in operation. Some of the aforementioned systems are the result of engineering or design by Impact's management team and we have extrapolated the most successful elements of each model described above. With the help of our unique supply chain partnerships, we have incorporated these elements into our AD system that is distributed in scale, more affordable than global counterparts, and designed to process post-consumer food waste.

Benefits

1. Production of continuous, onsite, renewable energy. The energy can be stored at night and used during the day if necessary. It does not depend upon sunlight or wind for production.

2. Elimination of foodwaste dumpsters with the associated odor, birds, flies, rodents, insects, and leakage that commercial foodwaste can produce.

3. Elimination of the hauling, fuel use, and traffic impacts associated with trucking waste from the city to a distant processing facility. This reduces urban traffic congestion as well as truck exhaust emissions.

4. Conversion of the organic materials into valuable plant food, compost, and fertilizer. This can be returned to the soil to improve the sustainability of local gardening.

5. New employment of people in the conversion of waste to bioenergy, commercial products, and the local food supply chain industry.

6. Collaboration with local educational curriculums such as culinary arts, horticulture, sustainable agriculture, viticulture and wine technology, engineering, environmental science, business, biology, and education.

7. Achieving significant diversion of waste from disposal, moving the city closer to zerowaste goals.

8. Improving the local soil-water-air ecosystem by returning carbon to the soil and displacing the need for chemical fertilizers, pesticides, and herbicides.

9. Improving the opportunities for farm-to-table food production and healthy food networks which will improve the well-being of its communities.

Beneficial Uses of Digested Food Waste

There are a number of market pathways for digestate. Some of them are complimentary to compost and mulch sales. The list below shows a few that can and should be considered:

1. Liquid fertilizers or soil amendments
2. Dried organic fertilizers
3. Dried and pelleted organic fertilizers
4. Dried and pelleted fuel
5. Constructed wetlands, forests, bogs, and other high-carbon soil banking projects
6. Constructed pasture and cropland
7. Constructed high organic matter crop land
8. Integrated farming systems in greenhouses and vertical farms
9. Hydroponic farming systems

Some of these produce heat and some require heat. Several of these systems can be combined to make a more robust and sustainable system. Employment opportunities are associated with all these pathways. These examples illustrate how diverse the options are for recycled product marketing. When combined with composting and gasification the list can also include these pathways:

10. Gasified biochar and charcoal products
11. Prepared (shredded and screened) and dried wood fuel
12. Integrated surface water treatment systems and living roofs
13. Non-traditional systems like vermiculture, aquaculture, black soldier fly cultivation

Elements to Achieve a Successful Project

The key elements for success in this type of project are shown below.

- Adequate financial capital to build and operate the facility
- A suitable real property site that is compatible with traffic, utilities, and land use
- A collection system that addresses economics, source separation education, and contaminant control
- A practical plan for the beneficial use of the renewable energy
- A practical plan for the beneficial use of the organic matter, water, nutrients and probiotics in the digestate
- A strong partnership with local farmers and the land and landscape