Bioenergy 2015: Opportunities in a Changing Energy Landscape

Renewable Natural Gas - Developer Perspective

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Your Economic Onsite Energy Solution
Overview

- MultiGen International
- Biogas
- Anaerobic Digestion
- Biogas Upgrade Technologies
- Development Risk
- Recommendations
MultiGen International, LLC

MultiGen International (MGI) – is a project development company focused on solving waste issues using **commercial** technologies

Established three legs of the stool

- **Expertise**
- **Capital**
- **Partner with Commercial Technology Providers**

  - **Anaerobic digester**
    - Food Waste
    - Animal Waste
    - Sludge

  - **Gasification**
    - Municipal Solid Waste (MSW)
    - Medical Waste
    - Tires
Biogas

Biogas is produced from the anaerobic decomposition of organic material

- Mixture of CH$_4$ (Methane) and CO$_2$
  - Can contain small amounts of Siloxanes and H2S

**Main Producers of Biogas**

- Landfill - 50-60% Methane
- Anaerobic Digesters (Wastewater Treatment) – 55-70% Methane
Biogas Generation and Utilization

- Waste Water Treatment
- Landfill
- Animal and Food Waste, and FOG to Anaerobic Digester
- Biogas GenSet - Medium BTU
- Biogas Cleanup - High BTU
- Electricity
- Steam
- Pipeline
- NG Pumping Station
Biogas Cleanup Technologies

There are multiple technologies on the market that are commercial:

- Pressure Swing Absorption
- Membrane
- Water Scrubbing

These technologies scrub the gas of CO2, Siloxanes and H2S which results in gas spec similar to:

CH4: >96%
CO2: ~1%
O2: <0.4%
Total inerts: <4% H2S: <1 ppm
H2O: <1 ppm Siloxanes: <1 ppm
Anaerobic Digesters - Byproducts

- Clean biogas can be converted to:
  - Renewable Electricity – Renewable Power
  - Renewable Natural Gas
  - Renewable Compressed Natural Gas - Transportation Fuel
  - Renewable Hydrogen Production
  - Other Renewable byproducts

- Biosolids - used for animal bedding, soil enhancement and a high quality fertilizer

- Liquid Effluent – nutrient rich liquid purified and separated from the solids
Anaerobic Digestion Process Flow
Anaerobic Digester – Key Facts

- AD Systems are Commercial
- Financeable
- Solve very serious and problematic waste issues
Solid Waste Permitting

- Permitting a manure based digester project is pretty straightforward.
- Once you start adding food waste you are restricted by the amount of food waste you can add based upon local or State requirements for a Solid Waste Permit.
- Food waste increases the production of gas.
- A solid waste permit is very costly and time consuming.
- A National Standardized process for AD systems to add food waste without going through the entire Solid Waste permitting process.
Currently each Natural Gas pipe owner has different Natural Gas specifications relative to

- $O_2$
- $N_2$

Stringency of pipe specifications can make or break a project's economics

Can cost millions of dollars in added equipment to meet specification
Renewable Natural Gas Production Priority

- Currently any producer of Natural Gas can be “shut in” for any reason.
- Being a small producer of Natural Gas and having an expected production capacity in the economics – being “shut in” can be very costly.
- Renewable Natural Gas is
  - Renewable
  - Solves current waste issues
Navigating National Agencies

- Currently – An AD project can potentially work across many agencies
  - US DOE – Transportation Fuel, PPA
  - US EPA – Emissions, Nutrient recovery
  - USDA – Agricultural waste and recovery
  - US DOT – RCNG retrofit kits, fuel quality, fueling stations
  - Department of Homeland security – Avian Flu and Swine Flu

- Compound that with State and Local Agencies the education process and coordination efforts become immense

- Multiple agencies to work through a project, coordination needed from policy perspective
Recommendations

- Cross coordination of Key Stakeholders – Round Table
- Create a National Renewable Natural Gas Pipeline Quality Specs
- Create a National Renewable Natural Gas Pipeline Interconnection standards
- Create a National Standardized process for AD systems to add food waste without going through the entire Solid Waste permitting process
- Move from a Grant to policy focus on wet waste
Please contact David Ross or Duane Penney if you have any questions or would like to discuss details.