CH4 Biogas
Green renewable energy

SWANA Presentation
June 20, 2012

CH4 Biogas, LLC
319 First Street
Atlantic Beach, FL 32233
http://www.ch4biogas.com/
Capabilities, technology and experience
Introduction to CH4 Biogas

**CH4 Biogas is a leader in US renewable energy projects**

- Builds, owns and operates mixed waste biogas facilities
- Proven technology with over 40 facilities built and operating globally
- Self-financed project development and on-going operations
- Fully operational facilities within 12 months
- 30 years operating experience in successful environmental businesses

*the right technology and the right team*
CH4 is founded on domain specific experience

History

• In 2008, CH4 Biogas was formed by Paul Toretta, Robert Blythe, and Karsten Buchhave to pursue biogas opportunities in the US renewable energy market

• The Company’s partners bring years of pertinent experience
  • Design, build, own and operate successful environmental businesses
  • Thorough understanding of biogas renewable energy market, environmental sustainability and the waste disposal needs of producers
  • Utilizing proven Danish technology through Bigadan A/S a market leader in large scale co-digestion (www.bigadan.com)
CH4 Biogas partners with Bigadan A/S to bring a proven technology to the US market

**Bigadan system features**

- Digester vessel up to 2.25 million gallon capacity
- Designed to handle mixed waste streams including livestock manure, food grade industrial waste and source separated organic waste
- Pre-digestion pasteurization for bio-security
- H$_2$S scrubber to clean biogas
- Pumps, switch gear and controls factory assembled and containerized
- Post digestion fiber separation for nutrient management
- SCADA process controls for automatic operation

**Bigadan A/S**

- Pioneer of co-digestion concept that is the operating model for the Danish biogas industry
- 30 years design, construction, and operations experience
- Extensive experience with mixed waste streams
- A market leader in Europe
Co-digestion model

Co-digest organic wastes from livestock producers, food processors, retailers and institutions

• Whey and other dairy processing waste streams
• Distillers yeast
• Inedible packaged foods
• Food processing screenings and DAF sludge
• Slaughter house waste streams
• Grocery and institutional source separated organics
• Fats, oils and grease
• Glycerin
• Livestock manure
• Spoiled animal feed
• Energy crops

Biogas used for CHP or RNG

Digested biomass dewatered to produce animal bedding and soil amendment

Liquid fraction land applied or sent to permitted WWTP
Synergy schematic

- Manure
- Food Waste
- Receiving / Mixing
- Anaerobic Digester
- Pasteurization
- Solids Separation
- Storage Lagoon
- Grid Generator
- Farm Generator
- H₂S Scrubber
- Electric Power
- Land Application
- Bedding

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Synergy Biogas

Project Specifications
- 425 T/day mixed-waste biogas facility located on 2000 cow Synergy dairy in Wyoming County, NY
- Feedstock is manure pumped from the dairy and organic waste trucked in from regional food processors
- 1.4 MW/h generating capacity
- Electricity and REC are sold over NYISO through a broker
- Digested biomass is dewatered to produce bedding for the dairy and liquid fraction is spread on cropland

Grant Support
- Received 1603 grant March 2012
- Awarded grants from NGRID and NYSERDA

Status
- Fully operational
Construction process

- Concrete foundation pads are laid for each of the tanks and containers
- Digester foundations will require piling in NC

- Digester top and first ring are stainless steel
- Jack system raises completed rings as tank is assembled
Arrival of containers and equipment

- Equipment arrives ready for assembly
- Pumping containers and engine containers are shipped ready for installation
Mechanical and installation

• Counter-flow heat exchangers

• Insulation and siding are added to the digester once the tank has been assembled
Synergy Biogas Facility
Systems designed for co-digestion

- Receiving
  - De-packaging and pre-processing
  - Capacity to equalize delivery schedules

- Pasteurization

- Complete mix digester vessel

- Management of digested biomass
  - Dewatering of digested biomass
  - Storage and seasonal land application
US biogas market opportunities

Livestock Producers
- Anaerobic digestion is basis of environmentally superior manure management for US livestock producers
  - USDA estimated 335 million tons of dry manure per year from US farms
  - US methane emissions from livestock manure management accounts for ~ 10% of total US methane emissions

Food Processors
- Food processors have site specific needs (across hundreds of US sites)
  - Residual/waste management to reduce carbon footprint and improve operations
  - Renewable energy for long term price stability

Regional Waste to Energy
- Diversion of organics from landfill disposal and tighter land application rules
  - EPA estimates 33 million tons of food waste end up in landfills and incinerators annually
- Compliance with RPS mandates
  - Over half of the states have a renewable energy mandates
US Market Drivers

Head winds
• Low energy prices
• ITC uncertainty
• Low cost disposal options for food waste
• High interconnection costs

Tail winds
• Renewable and carbon initiatives from private sector
• State level RPS programs
• State level waste diversion programs
• Project financing opportunities
Thank you

For information contact
Bob Blythe
CH4 Biogas, LLC
319 First Street
Atlantic Beach, FL 32233
607-592-4727
bblythe@ch4biogas.com

www.ch4biogas.com