AGENERGY USA, LLC

DEVELOPER OF ANAEROBIC DIGESTER PROJECTS

ENVIRONMENTAL SOLUTIONS WITH REAL ECONOMIC BENEFITS

April 2016
AgEnergy USA-Project Experience

• Developer of energy infrastructure projects
• Extensive New York (NYS) and Long Island Experience: AgEnergy, through its Clearview Power subsidiary completed development, financing and managed construction of four Long Island Projects representing $0.5 billion in total capital,
  • Brentwood-80MW Gas Combustion turbines
  • Freeport-80MW Gas Combustion Turbines
  • Shoreham-80MW JP40 Combustion Turbines
  • West Babylon-80MW Combined Cycle
• Completed development, financing and construction of multiple additional energy infrastructure projects over last 28 years representing in total over $1.5 billion
• Currently developing Anaerobic Digester projects that produce Renewable Natural Gas (RNG) from organic waste
• With our Partner, EDF Renewable Energy (EDF) completed development, financing and constructing of the largest anaerobic digester project in the world, the Heartland Biogas, LLC project in Weld County, Colorado.
Completed development, financing and construction of four 80MW power projects on Long Island representing $0.5 billion in total project capital.
HEARTLAND BIOGAS PROJECT

Heartland Project Description:

- Heartland is an anaerobic digester project using dairy manure and organic waste substrate in a high ratio, complete mix, co-digestion system.
- Heartland is using Denver metro region sourced food waste and other commercial organic waste and dairy manure from Weld County.
- The Project includes 6, 1.7 MG bio-reactors, Biogas Upgrading System, gas compression and pipeline interconnection to Colorado Interstate Gas company (CIG) pipeline.
- Heartland has a contract to sell 7,000 dekatherms (Dt) per day of pipeline quality Renewable Natural Gas (RNG).
- The finished Renewable Natural Gas (RNG) is compressed and then injected into the CIG pipeline and delivered to the Sacramento Municipal Utility District (SMUD) in California.
- The RNG will be used to produce a low cost and base load renewable electricity in an existing SMUD owned natural gas fired combined cycle power plant.
- Phase I will produce 4,700 Dt/day (28MW equivalent) of RNG beginning the summer of 2016 and Phase II is expected to produce the full 7,000 Dt/day by end of 2017. Current late stage start-up and commissioning gas production is 3,600Dt/day.
HEARTLAND – BIOREACTOR TANKS
HEARTLAND – BUS-BIOLOGICAL SCRUBBER-BIOREACTORS
HEARTLAND BIOGAS, LLC — BIOGAS UPGRADING SYSTEM
HEARTLAND BIOGAS, LLC-BIOGAS UPGRADING SYSTEM
HEARTLAND BIOGAS, LLC-BIOGAS BIOREACTORS
Heartland has installed a Tiger Unit to process a broad spectrum of waste products.

The Tiger Unit’s performance has been exceptional. We have processed:

- 20 tons per hour of canned goods
- Packaged milk, eggs, bagged waste, SSO, any waste material packaged in plastic, paper or cans (no glass)
- The Tiger Unit has been reliable, quiet and easy to operate.

The DPS allows the Heartland Project to receive a broader spectrum of waste material which has increased substrate supply volumes and our gas production capacity.

The DPS also receives “de-fill” waste which is stored in a separate tank but provides low solids dilution capacity for the higher solids material processed through the Tiger Unit.

The Tiger system produces an excellent quality substrate for pumping and use within the active bio-reactors.
• Heartland has developed the Digested Solids Separation operation that has also been very successful. The system consists of,
  • Two high efficiency Centrysis Centrifuges
  • Outdoor stacking pad and windrow storage on 15 acres
• The Heartland Digested Solids Separation operation produces a very high quality replacement peat moss material
• The Digested Solids structural characteristics and chemical composition is perfect as a peat moss replacement material (ph adjustment is required)
• The high efficiency volatile solids destruction rate of the thermophilic operating conditions results is no further composting of the material.
• The Centrysis Centrifuge produces a 65-68% moisture material (no free water)
BIG PICTURE

- The energy consultant IHI reports that total 2015 world wide investment in renewable energy was $286 billion.
- World wide investment in fossil generation was $130 billion
- Solar and Wind technology represent over 90% of the total invested capital.

INTERESTING FACT

- US Corporations are demanding renewable resources
- The renewable development market is defining the limitations to transmission capacity.

THE REAL CARBON PICTURE

- The 63GW’s of wind capacity added in 2015 will generate 120 TWHrs each year-this is equal to 20 mid-sized coal fired power stations
- There are 190 GW’s of coal under construction in China
- The US has retired 14 GW’s of coal in 2015.
AD RENEWABLE ENERGY-A COMPARATIVE ANALYSIS

CAPACITY FACTOR

• Solar 14% (NJ) versus AD 95%
• The average CF of the wind projects installed worldwide was 22%.
• The average CF of a AD project is 95%

COMPARATIVE ANALYSIS-THE REAL ECONOMIC BENEFITS

• It takes 7 times as much solar capacity (and corresponding energy) to achieve the same amount of AD produced energy.
• If New Jersey could support 100MW’s of AD Projects, you would need 700 MW’s of solar to produce the same amount of renewable energy.
• This is $400 million in AD projects versus $2.5 billion in solar (to achieve the same energy production level)
AD RENEWABLE ENERGY-A COMPARATIVE ANALYSIS

COMPARATIVE ANALYSIS-THE REAL ECONOMIC BENEFITS

• AD Projects result in significantly greater CO2 reductions than solar
• Major reductions in other emission sources
• AD projects achieve greater renewable energy production
• Natural resource requirement-4,900 acres for solar versus 200 acres for AD
• Lower waste disposal costs-superior waste management-price parity!!!!! Waste management sustainability
• Locational energy value-AD projects can be located within the region requiring energy. Less transmission resources required
• Jobs, jobs, jobs
AgEnergy USA, LLC

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