



AGENERGY USA, LLC

**DEVELOPER OF ANAEROBIC DIGESTER
PROJECTS: THE HEARTLAND BIOGAS PROJECT**

**THE POWER OF WASTE: RENEWABLE NATURAL
GAS (RNG) FOR COLORADO**

May 2016

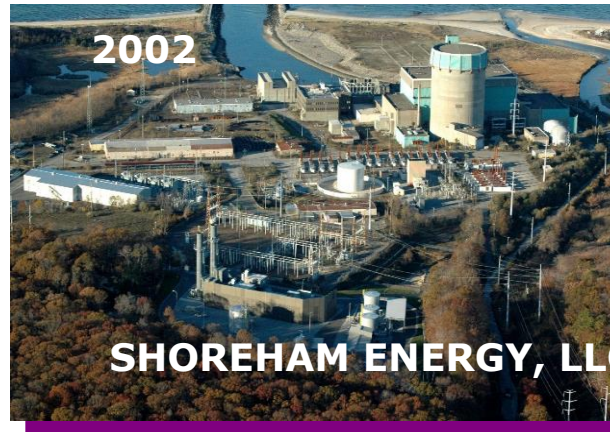
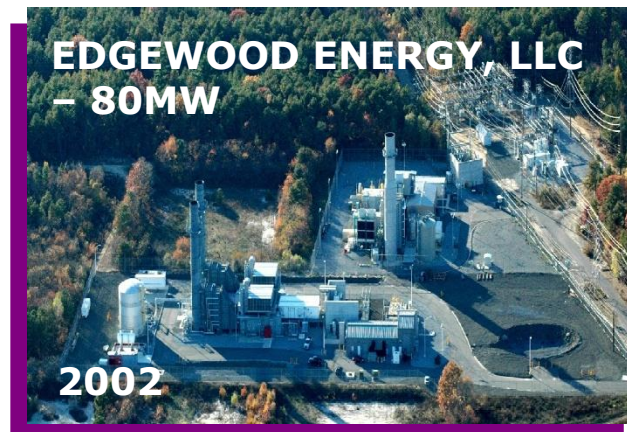
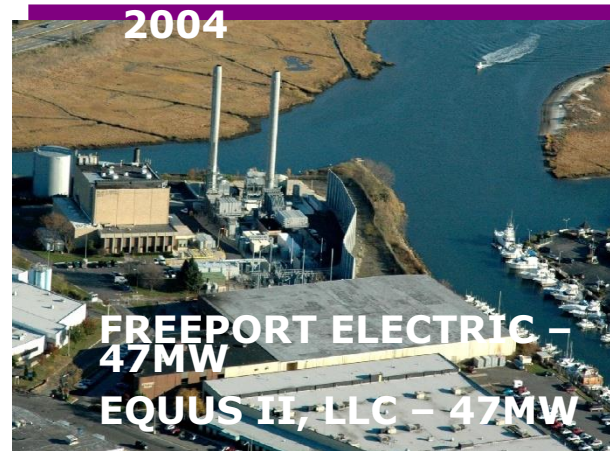
AGENERGY USA

AgEnergy USA-Project Experience

- Developer of energy infrastructure projects
- Extensive New York (NYS) and Long Island Experience: AgEnergy, through it's Clearview Power subsidiary completed development, financing and managed construction of four Long Island Projects representing \$.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.

LOCAL PROJECT DEVELOPMENT EXPERIENCE

Completed development, financing and construction of four 80MW power projects on Long Island representing \$.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 upto 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 – BIOREACTORS AND SUBSTRATE TANKS



HEARTLAND BIOGAS, LLC – BIOGAS UPGRADING SYSTEM



HEARTLAND BIOGAS, LLC-BIOGAS UPGRADING SYSTEM



HEARTLAND BIOGAS, LLC-BIOGAS BIOREACTORS



DIGESTER PROCESSING SYSTEM (DPS)

- 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 BIOGAS, LLC- DIGESTER PROCESSING SYSTEM



DIGESTED SOLIDS PRODUCTION

- 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)

HEARTLAND BIOGAS, LLC- DIGESTED SOLIDS PRODUCTION



HEARTLAND BIOGAS, LLC- DIGESTED SOLIDS PRODUCTION





AgEnergy USA, LLC

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Heartland Biogas Project

DPS Digester Processing System



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The Power of Waste:
Renewable Natural Gas (RNG)
for Colorado

A Workshop by Energy Vision & Denver Metro Clean Cities
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