Bio Fuels energy, LLC.

Turning Waste Into Renewable Natural Gas
Point Loma Wastewater Treatment Plant
Case Study- Five years after Commercial Operation

October 27, 2016
BioFuels Energy, LLC (“BFE”) secured long term bio-gas rights from the Point Loma Wastewater Treatment Facility. (By-product of competitive RFQ/RFP Process)

BFE purifies the digester gas such that the end product meets the new SDG&E pipeline injection standards (Rule 30) [First project in the State of California to do so]

BFE nominates the cleaned biogas (“directed biogas”) to the BioFuels customers and provides renewable energy under a long term Power Purchase Agreements:

- University of California San Diego (2.8 MW)
- City of San Diego South Bay Water Reclamation Plant (1.4 MW)

$45 M Total Capital Cost
UCSD 2.8 MW Fuel Cell
South Bay 1.4 MW Fuel Cell
Alternate Uses for Renewable Biogas from Wastewater Treatment Facilities, Landfills, or Food Digesters

- Renewable CNG as a Transportation Fuel
- As “Directed Biogas” for use in new Energy Generation Facilities
- For Sale to Investor Owned Utilities as Fuel in existing generation units to meet RPS goals
- For Sale to Commercial, Industrial, & Institutional Customers (boiler or generation applications)
BUDG Site
BioFuels Energy’s Pt. Loma Biogas Facility
BioFuels Energy’s Pt. Loma Biogas Facility
Point Loma Project Timeline

- City Issues RFQ for Digester Gas ........... Jan. 2007
- BUDG Biogas Agreements Executed .......... Oct. 2007
- Completed Project Financing .................. Nov. 2, 2010
- Initiated Construction ........................ Dec. 2010
- Fuel Cells Delivery ............................ August 2011
- Complete Construction ........................ Dec. 2011
  (started 10 year term)
Government Incentives

- Self-Generation Incentive Program (California Public Utilities Commission/California Center for Sustainable Energy)
  - $4,500 per KW of electricity rebated for first MW at each site
  - $2,250 per KW of electricity rebated for capacity 1 to 2 MW
  - $1,125 per KW of electricity rebated for capacity 2 to 3 MW

  - 30% of net project costs (after rebate above) available as a tax credit

- Federal New Market Tax Credits
  
  75% of project cost subsidized
BUDG SIMPLIFIED PROCESS CHAIN

Point Loma Digester Gas to Pipeline Gas
Simplified Process Chain

- Sulfatreat H2S Removal
- Pretreatment
- Air Liquide System
- Membrane Stage One
- Membrane Stage Two
- Activated Carbon Polishing
- Waste Gas Enclosed Flare

Digester Gas 59% Methane

Compression and Cooling

Permeate Recycle

Pipeline Quality Gas 98% Methane

BioFuels energy, LLC
Continuous Biogas Monitoring Equipment

- Moisture & CO2 Analyzer
- O2 Analyzer
- Gas Chromatograph
- Sulfur Chromatograph
- H2S Monitor
- Flow Measurement
- Temperature/Pressure
- Heat Content (every few minutes)
- Siloxanes
San Diego Gas & Electric Rule 30
Biomethane Gas Delivery Specification

- 990 min BTU HHV (992)
- Oxygen < .2% (.1%)
- CO2 < 3.0% (.5%)
- Siloxanes <= 0.1 mg Si/m3 (.004)
- Water Vapor 7 lb/MMscf or less
- Total Sulfur .75 gr. S/100 scf
- BioFuels (in red) meets all Rule 30 requirements
Significant Biogas Project Issues

- Variability of Digester Gas Supply in establishing Plant Capacity (Design for swings in 24 hour period vs average).
- Interface with existing site flares. Site flares require minimum Btu’s for operation.
- Developer responsible for installation of utility gas interconnection then turn over to the utility.
- Location of Gas Extraction Location (impact on digester dome pressure) with managing gas pull to accommodate max digester dome pressures.
Challenges to Developing Biogas Projects

- Cost of Biogas interconnect high and installation is provided on a cost plus basis from the utility.
- Uncertainty over requirement for new BTU District.
- Challenge of matching significantly reduced natural gas prices; renewable premium not sufficient to cover price differential.
- No long term market for RINS.
- Risk in meeting utility gas specifications.
- Changing Biogas Quality Injection Requirements.
- Difficulty of securing a operational guarantees to meet Rule 30.
Thank You,

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