Renewable Natural Gas Projects

EPA Technology Transfer Workshop
Renewable Natural Gas – Driving Value for Natural Gas and Biogas Sectors

September 26, 2017

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Discussion Topics

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2. Interconnection: Overview of Components and Costs

3. Renewable Natural Gas Projects
   1. Biogas Upgrading Demonstration Project at the Hale Avenue Resource Recovery Facility
   2. Biofuels Point Loma Wastewater Treatment RNG Project
   3. CR&R Anaerobic Digestion Facility
   4. SB 1383 Dairy Pilot Projects
SoCalGas Overview

» Southern California Gas Company (SoCalGas) has been delivering clean, safe and reliable natural gas to its customers for 150 years

» A regulated public utility that provides gas service to 21.6 million consumers

» Nation’s largest natural gas distribution utility with 5.9 million meters
Two Primary Components of the Term “Interconnection”

“Interconnection” = “Point of Receipt” + “Pipeline Extension”
The Point of Receipt

1. **Monitors gas quality** to ensure it meets SoCalGas Rule 30 Gas Quality Specifications (e.g. CO₂, O₂, total inerts, heating value, H₂S)

2. **Prevents non-compliant gas** from entering the utility pipeline network should the monitored Rule 30 parameters not be met

3. **Meters and odorizes** the volume of RNG put into the utility pipeline network
**Pipeline Extension** is the pipe installed from the outlet of the Point of Receipt to the nearest utility pipeline having the capacity to accept the interconnector volume of RNG.

- Majority of the pipelines in streets are **distribution lines with limited takeaway capability to accept interconnector gas** during summer months (particularly in the early a.m. hours)
  - May result in high pipeline extension costs because the nearest pipeline having the capacity is miles away.

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**Illustration**

Nearest SoCalGas pipeline to Point of Receipt (e.g. 500 feet away) but doesn’t have the capacity

Point of Receipt

Pipeline Extension

Nearest SoCalGas pipeline that has the takeaway capacity to accept supply (e.g. - 2 miles away)
SoCalGas Biogas Upgrading Demonstration Project at the Hale Avenue Resource Recovery Facility (HARRF)

HARRF Information

» Wastewater treatment facility located in Escondido, CA
» Average Daily Flow ~ 15.6 MGD
» Biogas was being flared prior to start of demonstration project
» Biogas Production ~ 95 million cubic feet per year
» Biogas contains enough energy to supply ~1,200 homes

SoCalGas Biogas Upgrading Demonstration Project at the Hale Avenue Resource Recovery Facility (HARRF)

Xebec Pressure Swing Absorption Unit at the HARRF

- Demonstration project occurred in 2011 and 2012

- Typical Weekly Operating Data
  - Avg Feed Flow - 158 scfm
  - Avg Product Flow (biomethane) – 85 scfm
  - Avg Product Quality – 99.2% methane
  - Avg Methane Recovery – 90%
  - Avg Product H2S – 0.12 ppm
    - Rule 30 limit is < 4.0 ppm
  - Siloxane range – 0.005 to .04 mg Si/m3
    - Rule 30 lower action level = 0.1 mg Si/m3

- The demonstration project validated biogas can be safely and efficiently upgraded to SoCalGas Rule 30 pipeline quality specifications
Biofuels Point Loma Renewable Natural Gas Project
Overview

- Point Loma Wastewater Treatment Plant treats approximately 175 million gallons of wastewater per day generated by ~2.2 million area residents.

- Prior to the project, the plant was flaring more than 1.3 million cubic feet per day of digester gas.

- The plant partnered with BioFuels Energy, LLC, to condition/upgrade wastewater digester gas and feed it into the natural gas pipeline system.

- Since 2012, the RNG is injected into the utility pipeline and used to power a 2.8 MW fuel cell at UC San Diego and a 1.4 MW fuel cell at South Bay Water Reclamation Plant in San Diego.

- Total project cost of $45 million, 75% was subsidized through incentives and tax credits.

Data and Photo Sources
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

Source of slide: SoCalGas/Energy Vision RNG Workshop – 10/27/16

Actual Gas Test Results at the Point Loma Biogas Upgrading Facility in Red Text
CR&R Renewable Natural Gas Project Overview

- CR&R Waste and Recycling Services is a recycling and waste collection company, serving more than 2.5 million people and 5,000 businesses throughout Orange, Los Angeles, San Bernardino, Imperial, and Riverside counties.

- Project Details*:
  - Two of the four phases are complete with each phase capable of handling ~83K tons/year of organic waste.
  - Each phase is expected to produce ~1,000,000 diesel gallon equivalent (DGE) of vehicle fuel per year, enough to fuel ~80 of CR&R’s CNG waste trucks.
  - Each phase is capable of producing 10 million gallons/year of liquids (fertilizer) and 35,000 tons/year of solids (soil product).
  - Equipment Vendors: Eisenman (anaerobic digestion) and Greenlane Biogas (biogas upgrading).
  - Cost: Over $100 million at full buildout.
  - Construction began in 2014 and RNG expected to flow into SoCalGas pipeline in October of 2017.

- The CR&R project will be the first RNG-to-pipeline project in SoCalGas’ service territory.

* Sources of Information
http://biomassmagazine.com/articles/10641/crr-breaks-ground-on-california-ad-facility
https://www.biocycle.net/2017/05/01/high-solids-digester-services-california-municipalities/
CR&R Renewable Gas Project Overview

Overview

- Installation of approximately 1.4 miles of 8” high pressure steel pipe (directional bore method)
- Majority of the street where pipe was installed did not have curb and gutter (minimized the need to cut asphalt/concrete)
- Pipeline crossed the San Jacinto Canal and required obtaining several permits
Overview of SB 1383

- SB 1383 directs CARB to implement regulations to reduce emissions of Short Lived Climate Pollutants (SLCPs). By 2030, requires a reduction of the following compared to 2013 levels:
  - 40 percent reduction in methane
  - 40 percent reduction hydrofluorocarbon (f-gases)
  - 50 percent reduction in black carbon (such as diesel)

Some Dairy Related Sub-Parts of SB 1383

- Directs CARB to adopt regulations to reduce methane emissions from livestock manure management operations and dairy manure management operations by up to 40 percent below 2013 levels by 2030
  - Approximately 45% of all methane emissions in CA come from dairies, 25% from manure and 20% from enteric fermentation

- No later than January 1, 2018, CPUC to direct gas corporations to implement not less than 5 dairy RNG injection pilot projects. Reasonable pipeline infrastructure costs are recoverable in rates
SB 1383 - Dairy RNG to Pipeline Pilot

Representative renewable gas operating model

1. Digester at Each Dairy
   - Digester #1 (X,000 cows)
   - Digester #2 (X,000 cows)
   - Digester #3 (X,000 cows)

2. Biogas Conditioning Facilities and Collection Lines
   - Monitor and Meter Biogas
   - Remove H2S and H2O
   - Biogas Compression

3. Biogas Conditioning and Upgrading Facility
   - (Sequence of processing, monitor/metering, and compression equipment may differ)

4. Interconnection (Point of Receipt)
   - RNG Piping
   - Point of Receipt

5. Interconnection (Pipeline Extension)
   - RNG Piping
   - Pipeline Extension

6. Existing Pipeline Network
   - NGV Fueling Station or Other End-use

SoCalGas - a Sempra Energy utility
Thank You

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