

Renewable Natural Gas Projects

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

September 26, 2017

Jim Lucas
Market Development Manager



A  Sempra Energy utility

Discussion Topics

1. SoCalGas Overview
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

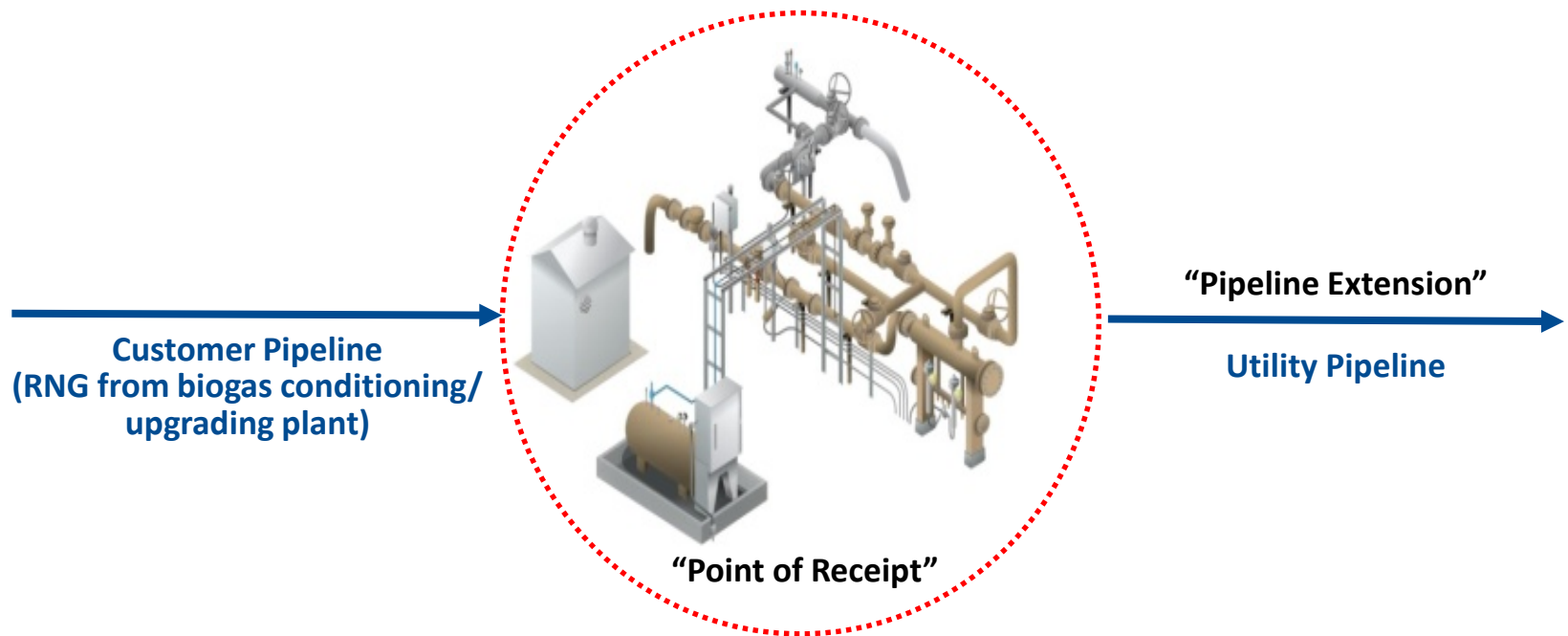
SoCalGas Overview



- » 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

Interconnection: Overview of Components

Two Primary Components of the Term “Interconnection”



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

“Point of Receipt” Component of the Interconnection



Point of Receipt at CR&R Perris

The Point of Receipt

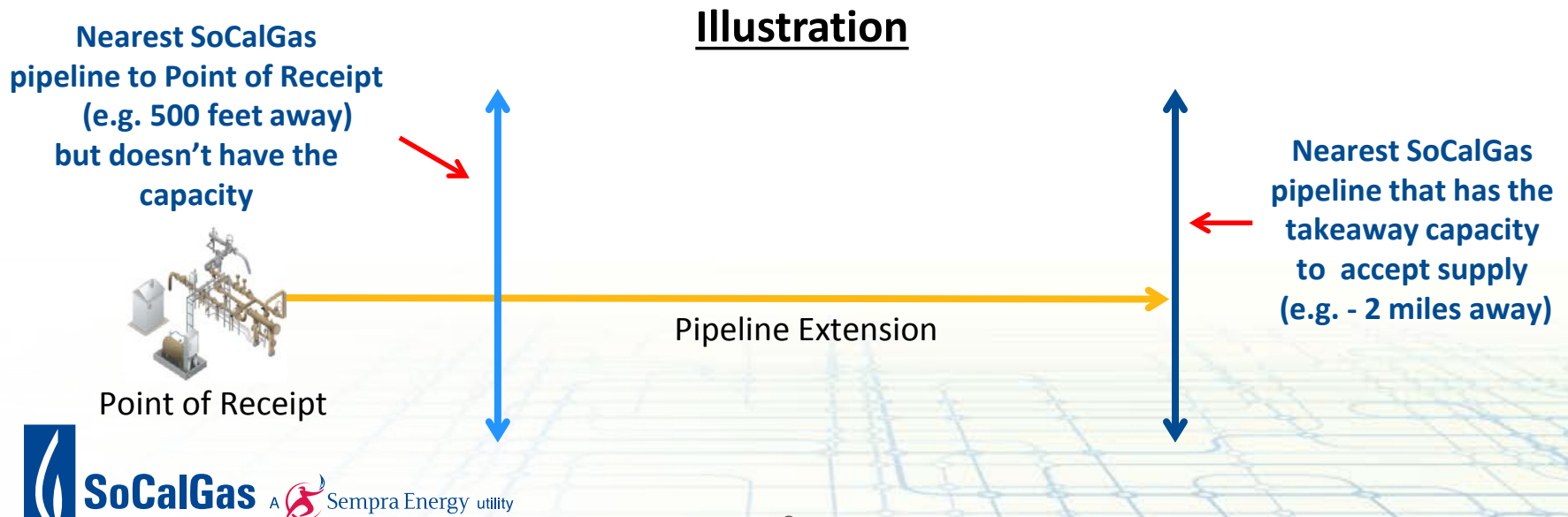
1. **Monitors gas quality** to ensure it meets SoCalGas Rule 30 Gas Quality Specifications (e.g. CO₂, O₂, total inerts, heating value, H₂S)
2. **Prevents non-compliant gas** from entering the utility pipeline network should the monitored Rule 30 parameters not be met
3. **Meters and odorizes** the volume of RNG put into the utility pipeline network



Point of Receipt at BioFuel Point Loma Facility

“Pipeline Extension” Component of the Interconnection

- » **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



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



Source of photo: www.escondido.org/water-treatment-plant.aspx

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



Biofuels Point Loma Renewable Natural Gas Project Overview

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

16

BioFuels
energy.u.c.

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

<https://www.socalgas.com/1443740098116/Biogas-to-RNG-at-Point-Loma-Wastewater-Treatment-Facility.pdf>

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>

<http://www.paulrelis.com/california-msw-organics-digester-prepares-to-launch/>

<https://www.biocycle.net/2017/05/01/high-solids-digester-services-california-municipalities/>

CR&R Renewable Gas Project Overview

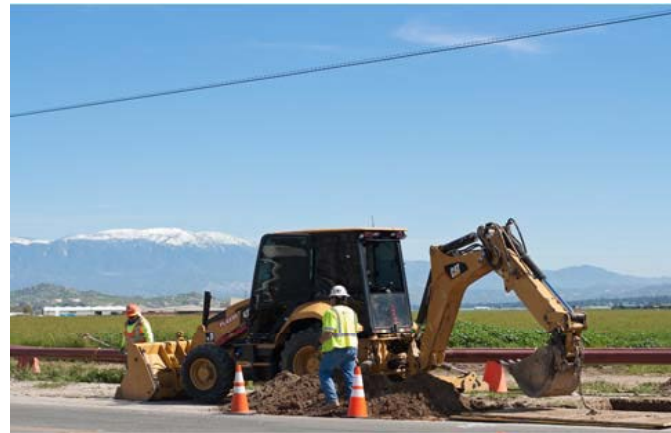


* Source of picture - <http://www.jrma.com/projectsdetails/cr-r-environmental-center-ad-facility>

Overview of Pipeline Extension – CR&R Perris

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

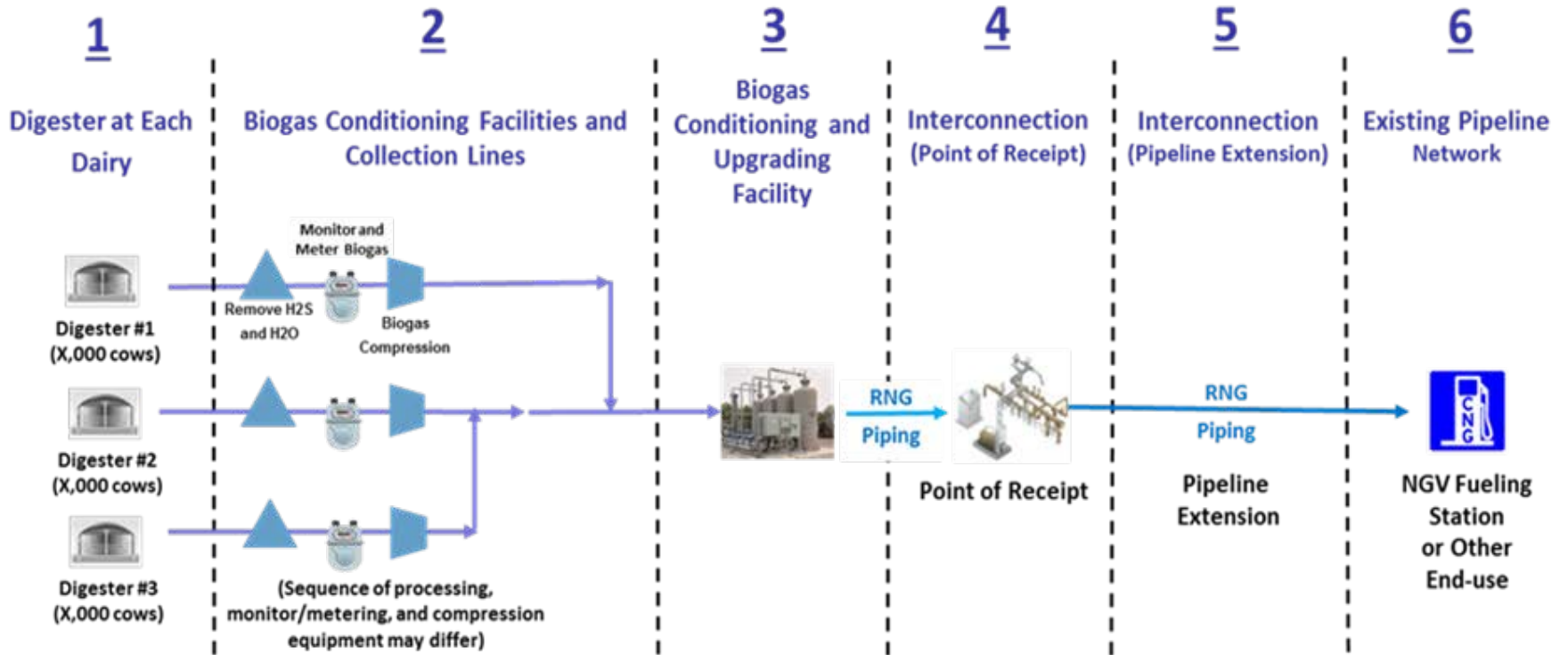
- SB 1383 directs CARB to implement regulations to reduce emissions of Short Lived Climate Pollutants (SLCPs). By 2030, requires a reduction of the following compared to 2013 levels:
 - ✓ 40 percent reduction in methane
 - ✓ 40 percent reduction hydrofluorocarbon (f-gases)
 - ✓ 50 percent reduction in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



Thank You

Jim Lucas

Market Development Manager

jlucas@semprautilities.com