Southern California Gas Company

A Sempra Energy utility®

Drivers and Challenges of Producing Renewable Natural Gas in California

Securing California's Clean Energy Future
with Renewable Natural Gas
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Overview

1) What are the Market Drivers to Produce Renewable Natural Gas (RNG)?

2) Challenges to Produce RNG

3) Some Current Biogas Projects/Programs in California

What Are The Market Drivers to Produce RNG?

1) **Transportation Fuel** - When RNG is used as a transportation fuel from a qualified feedstock, credits can be generated and sold which increases the market value of RNG

Low Carbon Fuel Standard (LCFS) – program to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020

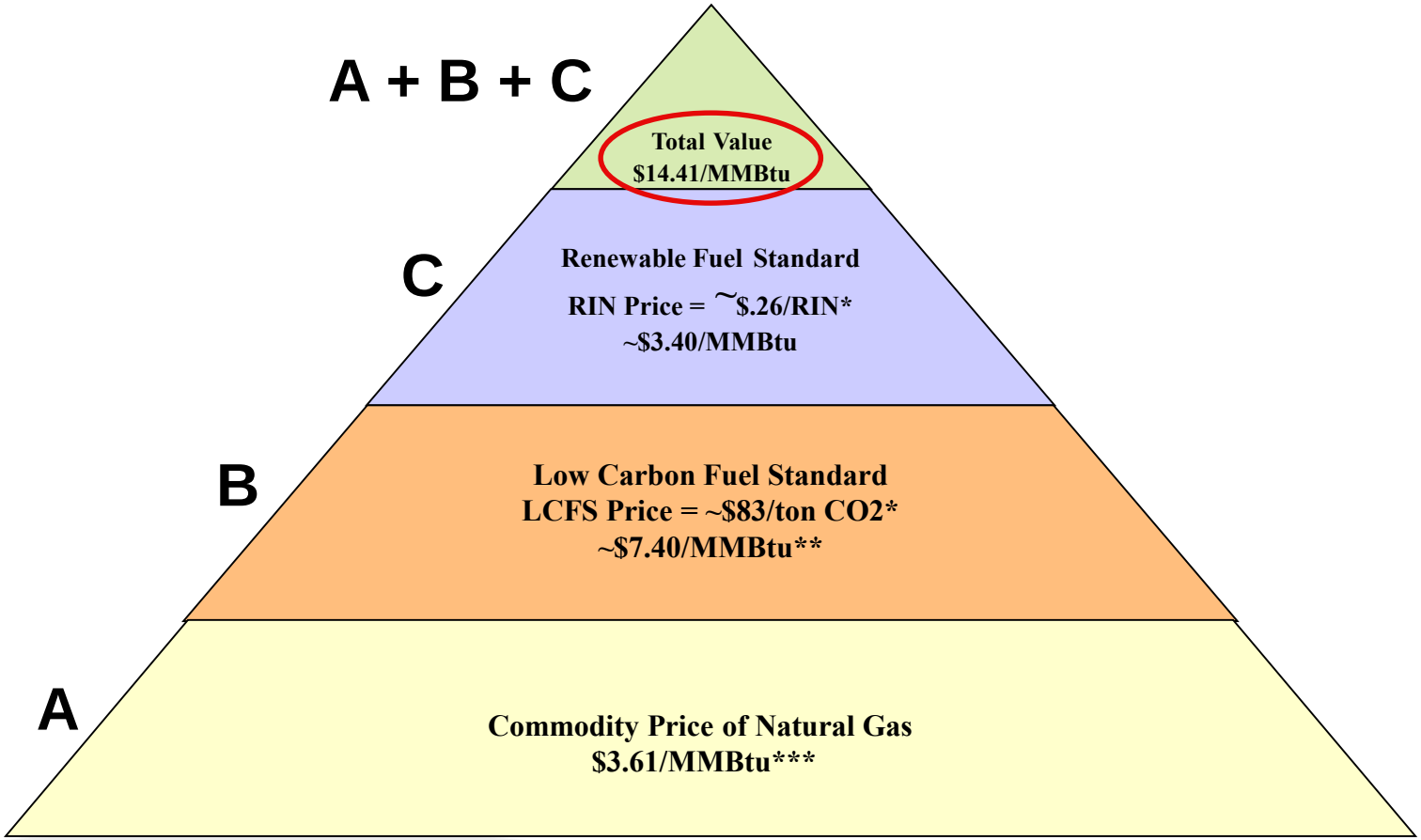
- Carbon Intensity Values*:
  - Dairy biogas = ~86% lower than gasoline
  - Natural gas = ~32% lower than gasoline

Renewable Fuel Standard (RFS) – federal program that requires petroleum refiners and importers of gasoline to demonstrate that a portion of the fuel they sell is renewable

* http://www.arb.ca.gov/fuels/lcfs/lu_tables_11282012.pdf

What are the Market Drivers to Produce RNG?

Total Value of RNG When Used as a Transportation Fuel



* Prices as of 11/14/13

** Assumes carbon intensity for dairy biogas

** Approximate Henry Hub Natural Gas Future Price – December 2013

What are the Market Drivers to Produce RNG?

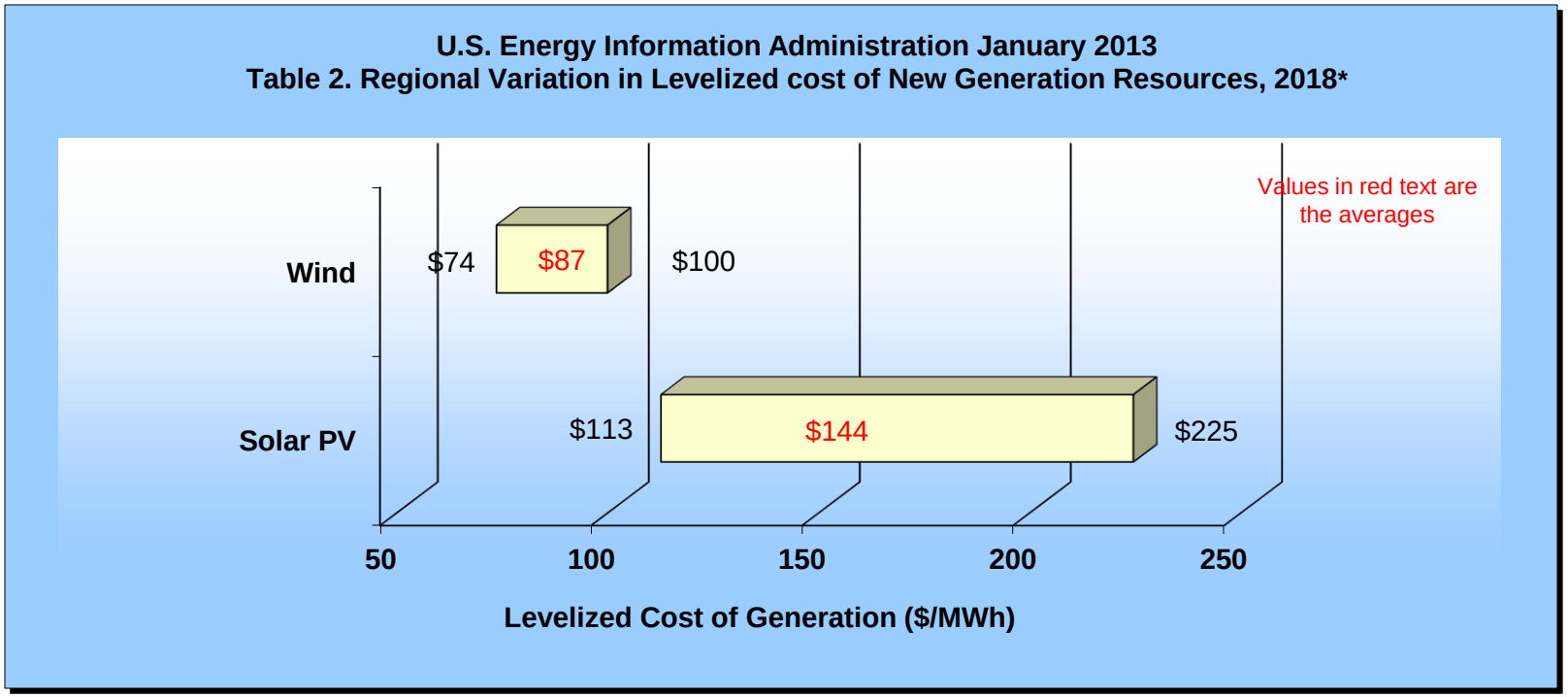
2) **Electric Generation** - RNG can be used as the fuel source to produce renewable energy (utility scale and distributed generation)

- **Renewables Portfolio Standard (RPS)** – RNG can be used to help achieve California RPS goals, 33% by 2020
  - RNG must show one of the following benefits in California:
    - Reduction or avoidance of any criteria air pollutants
    - Reduction or avoidance of pollutants that could have an impact on water quality
    - Mitigating any emission of odors

- **Self Generation Incentive Program (SGIP)** - California Public Utilities Commission mandated program providing incentives to support existing, new and emerging distributed energy resources

What are the Market Drivers to Produce RNG?

California Renewables Portfolio Standard (RPS) – RNG can be used to help achieve RPS goal of 33% by 2020



* Source Report: http://www.eia.gov/forecasts/aeo/er/electricity_generation.cfm

What are the Market Drivers to Produce RNG?

California Renewables Portfolio Standard (RPS)

The Following Technologies Can All Produce RPS Eligible Energy

Wind
(Avg $87/MWh)

or

RPS Certified Production Facility Using RNG
(assuming $110/MWh or $15.89/MMBtu)

or

Solar
(Avg $144/MWh)

A		B		C		D		
Biomethane ($X.XX/MMBtu)	**+**	**Combined Cycle Power Production Levelized Fixed Cost* ($22.86/MWh) ($3.30/MMBtu)**	**+**	**Combined Cycle Power Production Levelized Variable Cost* ($4.04/MWh) ($0.58/MMBtu)**	**+**	**Gas Transportation (~$1.75/MMBtu)**	**=**	**RPS Certified Production Facility Using RNG ($15.89/MMBtu)**

Based on the illustration above, the potential market price of RNG is $10.26/MMBtu

* Using 2011 CPUC Market Price Referent Model. Assumes project start date of 2018, 20 Year Contract, and average heat rate of 6,924 btu/kWh)

What are the Market Drivers to Produce RNG?

Self Generation Incentive Program (SGIP) – California Public Utilities Commission mandated program providing incentives to support existing, new and emerging distributed energy resources

Technology Type	Incentive ($/W)
Renewable and Waste Heat Capture	Onsite
Wind Turbine	$1.19
Bottoming-Cycle CHP	$1.19
Pressure Reduction Turbine	$1.19
Conventional Fuel-Based CHP	
Internal Combustion Engine	$0.48
Microturbine	$0.48
Gas Turbine	$0.48
Emerging technologies	
Advanced Energy Storage	$1.80
Biogas	$1.80
Fuel Cell – CHP or Electric Only	$2.03

Challenges to Produce RNG

1) Policy Changes = Market Uncertainty

a) Past

- March 28, 2012 to April 30, 2013 – suspension of biomethane as RPS-eligible
  - September 27, 2012 – Signing of Assembly Bill 2196 modified the RPS eligibility requirements for electrical generation facilities using biomethane

b) Current

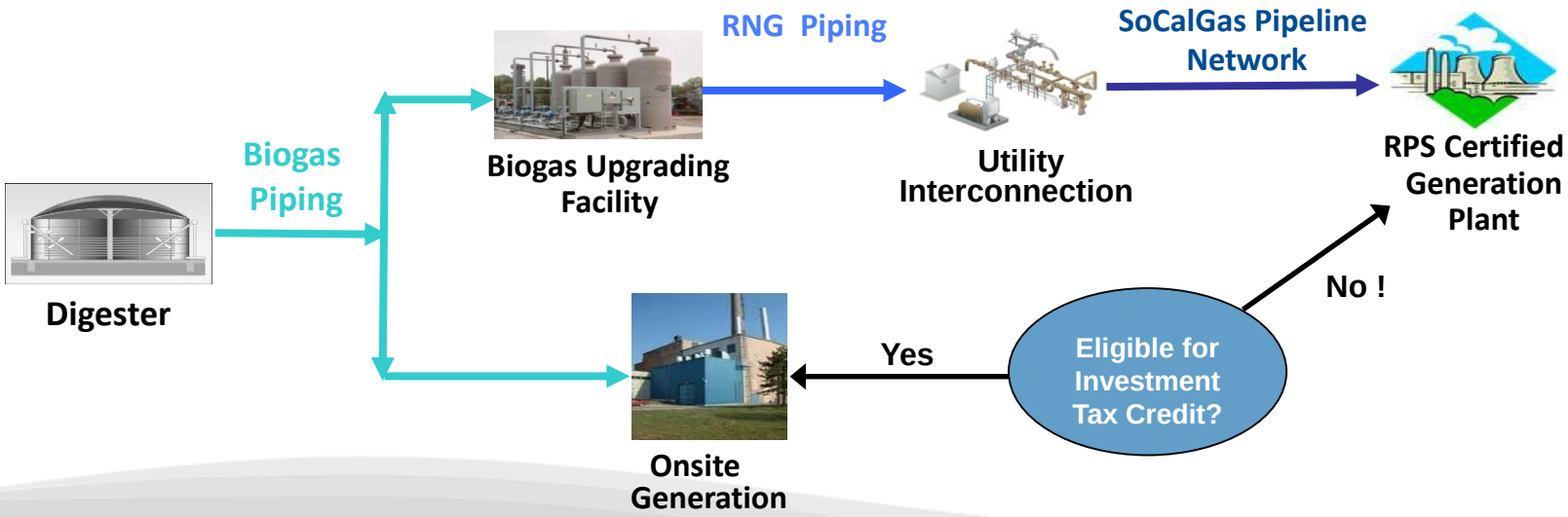
- September 27, 2012 – Signing of AB 1900 by the governor which will result in the CPUC adopting new pipeline quality gas specifications on or before December 31, 2013
  - Difficult to design a biogas upgrading facility based on an unknown pipeline quality gas specification
- Pending lawsuits against the LCFS and Renewable Fuel Standard (RFS2)

Challenges to Produce RNG

2) Project Scale

- Small to medium scale biogas production facilities are not economical
- Minimum threshold is approximately 1.5 million standard cubic feet per day for favorable economics (including interconnection costs)
  - Based on RNG market price of $9-12/MMBtu

3) Illustration: Incentives are uneven and needed for RNG production



Some Current Biogas Projects/Programs in California

1) **Point Loma Wastewater Treatment Plant**
   - Only project in California putting RNG into the utility pipeline
2) **Redeem by Clean Energy**
   - Announcement made in October 2013 and will commercially distribute RNG vehicle fuel directly to fleets around the country and the 35 public Clean Energy stations in California
3) **Hilarides Dairy**
   - Biogas is captured from a lagoon digester and used for: 1) onsite generation and 2) CNG for their milk trucks and pick-up trucks
4) **Gil's Onions**
   - Takes onion waste to produce biogas and generate power onsite using fuel cells
5) **SoCalGas' Proposed Biogas Conditioning/Upgrading Services Tariff**
   - Application filed on 4/25/12 with CPUC seeking authority to design, install, own, operate and maintain biogas conditioning/upgrading equipment on or adjacent to customer premises

Thank You

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