



Renewable Natural Gas

A Developer's Perspective of the RNG Industry

Behold the Future for RNG

And...Brace Yourself! It's Changing...Fast!

Presenter:

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Meet the Presenter

- **Evan Williams – President of Cambrian Energy Development LLC**
 - Developer of 50 LFG-to-energy projects and 3 RNG Projects; co-developer of largest RNG production project in U.S. at McCommas Bluff Landfill in Dallas, Texas
 - Chairman and co-founder of Coalition for Renewable Natural Gas
 - Major equity holder and manager of group of companies that cost-effectively convert existing medium and heavy duty diesel engines to CNG using remanufactured to like-new repowered engines.



Overview

- Beware of the California contagion
- Where and how will RNG be produced in the future?
- Policies that Drive RNG Economics
- Single Most Important Barrier to Growth of RNG for Transportation
- Can RNG help a natural gas pipeline stay increasingly relevant?
- How can I lend my voice to support RNG?



The California Contagion

- One of California's primary exports:
REGULATIONS
- Prepare yourself! Some of California's regulations may be headed your way...
- Not all of California's laws and regulations align with economic or technical reality
 - i.e., don't assume California always knows what it is doing



The California Contagion

- **2012 – AB 1900, supported by the Coalition for Renewable Natural Gas, was signed into law**
 - Overturned provisions of the 1988 Hayden Amendment which led to a ban on injecting RNG into California natural gas pipelines
 - Intent of AB 1900 was to promote RNG in California
- **2014 – California PUC adopts regulations with different, but more restrictive, provisions than Hayden Amendment**
 - Maximum allowable siloxane standard that approaches non-detect levels
 - No change to minimum heating value of 990 btus/scf
 - Extensive testing and measurement of Constituents required
 - No change to prohibitive pipeline interconnection costs
- **2016 – SB 840 adopted that requires study by California Council on Science and Technology of minimum heating value and maximum siloxane standards for RNG**



The California Contagion

- **Bonus Offer: copy of filing made March 11, 2016 by the Coalition for Renewable Natural Gas with the California Public Utilities Commission titled: Revisiting AB 1900 Biomethane Pipeline Injection Regulations to Remove Barriers Preventing Biomethane Project Development in California – 487 pages with exhibits**
 - Provide me with an e-mail address to send a link to my Dropbox account to download the report



Where and How Will RNG Be Produced in the Future?

- More evidence that the California contagion is infecting other states and regions
- Organics in landfills decompose to form landfill gas, the largest source of biogas that can be converted to RNG in the U.S.
- Landfill gas that is not captured is a greenhouse gas, so...California has legislated against the source of such greenhouse gas
 - 2011 – AB 341 – 75% recycling goal by 2020
 - 2014 – AB 1826 – requires businesses, public entities and multi-family residences that generate 4 cubic yards or more of solid waste per week to arrange for recycling services
 - In essence, organics are diverted from being deposited in landfills



Where and How Will RNG Be Produced in the Future?

- **Words Matter - Political Mandates Must Line Up with Reality**
- **The key word in a program for Solid Waste Disposal is “DISPOSAL”**
- **For any recycling program to be sustainable, there must be a market for the materials being recycled**
- **How can California’s laws and regulations to divert solid waste and organics from landfills best be illustrated?**





Uh Oh!!!

So....What Methods Can Be Used in California to Recycle Diverted Organics and “Dispose” of Them?

- **Composting (no RNG produced)**
- **Anaerobic Digestion (10-40% of organics convert to RNG)**
 - Wastewater Treatment Plants (POTWs)
 - Dairy Waste Digesters
 - Organic Waste Digesters
- **Gasification (85-90% of organics convert to RNG)**
 - All organic types, including woody biomass in forest & agricultural residues
 - Issues exist as to definition of and credits for Gasification in California
 - In CA must accomplish gasification conversion without using air or oxygen except ambient air to maintain temperature control
 - Oxygen is used in gasification thermal conversion process, but is not combusted
 - Cities and counties do not get diversion credit if waste provided for gasification
 - Diversion credits are given for composting and anaerobic digestion
 - Projects limited to 500 tons per day
 - In CA, Gasification-produced RNG qualifies for RPS; RNG produced by pyrolysis technology does not
- **Other Technologies (in development)**
 - Organics to Diesel
 - Organics to Methanol
- **NOT Incineration**



Can You Expect Organic Diversion Goals in Your State or City?

- They exist in California
- They have been adopted in some Northeastern states where landfill space is scarce
- Gasification projects of organics-to-RNG can be co-located with and are complementary to existing landfill gas-derived RNG projects



Policies that Drive RNG Economics

- **State Renewable Portfolio Standards**
 - Require electric utilities and other electricity providers to acquire minimum percentage of generation from renewable sources
 - For RNG – value can range from \$8/MMBtu to \$15/MMBtu
- **State Low Carbon Fuel Standards**
 - California and Oregon
 - Allow state credits for use of alternative fuel used for transportation
 - Value can range from \$2 to \$3/MMBtu
- **RNG is Biomass-derived fuel under California Cap and Trade regulations**
 - Exempts users of RNG from purchasing Cap and Trade credits as to emissions resulting from use of RNG and has value as to the avoided cost of such credits
 - Will have increasing value as allowable emissions are decreased, causing need to purchase more Cap and Trade credits to meet more stringent emission standards



Policies that Drive RNG Economics

- **Federal Renewable Fuel Standard (“RFS”) administered by EPA**
 - Provides highest value market today for RNG
 - RNG must be used as transportation fuel
- **RFS requires Obligated Parties (primarily refiners of transportation fuel) to purchase credits registered with EPA from 4 categories of renewable fuels**
- **Today, for landfill gas-derived RNG there are 11.727 RINS/MMBtu**
- **RINs derived from landfill gas are D3 or Cellulosic RINS (the narrowest category under RFS) with a recently traded value of \$3.00 per RIN**
 - So RIN value for RNG from landfill gas = \$35.18
- **EPA sets Renewable Volume Obligations for each category of RIN**
 - If RVO is reduced, it may mean there will be more supply of RNG than demand
 - Under such circumstance the value of a RIN will decrease



Single Most Important Impediment to Growth of RNG Market



RNG Market Needs More of These...



CNG VEHICLES



Barriers to Increase in Number of Medium Duty & Heavy Duty CNG/LNG Trucks

- **Cost**
- **New CNG truck is \$30,000 to \$100,000 more than comparable diesel truck**
- **Until diesel prices increase, fuel savings alone won't provide payback on increased price**
- **Solution: repower of existing diesel trucks to CNG with remanufactured CNG engines**
 - **Total conversion costs are less than cost of new diesel truck and approximately one-third to one-half cost of new CNG truck**



Can RNG Help a Natural Gas Pipeline Stay Increasingly Relevant?

- California has stated its goal is to rid the state of all fossil fuels by 2050!
- So....how then does California view the natural gas pipeline industry in 2050.





Can RNG Help a Natural Gas Pipeline Stay Increasingly Relevant?

- Natural gas is a fossil fuel; RNG is NOT
- RNG is compatible with natural gas
- The natural gas pipeline system is the means by which RNG is most commonly transported for its end use, whether for transportation or production of renewable electric power
- RNG used to fuel an ultra-low NOx heavy duty dedicated CNG engine has a lower emission profile than an electric heavy duty vehicle (if it existed, which it does not) powered from the California electric grid
- Now is the time for the RNG industry and the natural gas pipeline companies to join forces to stress the importance of the existing natural gas pipeline infrastructure to the future growth of the RNG industry



How Can I Lend My Voice to Support RNG?

- If you are not already a member, join the Coalition for Renewable Natural Gas, the non-profit trade association that represents all sectors of the North American RNG industry, and participate in its industry Advisory Boards.
- Go to www.rngcoalition.com for membership information.



Thanks for Listening!!

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