How to Double Your Dollars for Biogas

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Agenda

• Renewable Natural Gas
• Renewable Fuel Standard
• Define Renewable Identification Numbers (RIN)
• RIN pathways
• So what?
• Export Paths
• Tips
• Resources
So What?

Comparison of Biogas Utilization

Assumptions:
- 2 $/gallon diesel fuel
- 100 Scfm biogas
- 600 btu/cf
- 0.06 $/kwh average electric cost
- 80% Boiler efficiency
- $/dktherm average natural gas cost
- 2.5 $/RIN value
Renewable Fuel Standard

• Reduce greenhouse gas (GHG) emissions and expand the nation’s renewable fuels sector while reducing reliance on imported oil.
• EPA set numbers for each category of pathway
## Pathways – Advanced Biofuels

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulosic</td>
<td>D3</td>
<td>Any process that converts cellulosic biomass to fuel: ethanol, renewable gasoline, biogas-derived CNG and LNG</td>
</tr>
<tr>
<td>Biomass</td>
<td>D4</td>
<td>Biodiesel, renewable diesel, jet fuel, heating oil</td>
</tr>
<tr>
<td>Advanced Biofuel</td>
<td>D5</td>
<td>Biodiesel, renewable diesel, sugarcane ethanol, heating oil, waste digester-derived CNG and LNG</td>
</tr>
<tr>
<td>Renewable Fuel</td>
<td>D6</td>
<td>Corn ethanol</td>
</tr>
<tr>
<td>Cellulosic Diesel</td>
<td>D7</td>
<td>Cellulosic diesel, jet fuel heating oil</td>
</tr>
</tbody>
</table>
Define Renewable Identification Numbers (RIN)

- RIN = 77,000 Btu
- Created when dispensed into a vehicle
- A tradeable commodity
Where RINs are Created

Dairy Anaerobic Digester → BioGas Processing Facility → On-site CNG Station

Landfill Gas Collection System → BioMethane

PIPELINE

CNG/LNG Station

End User
- Residential
- Commercial
- Industrial

LDC Utility

Pipeline System
- To be moved by markets to other markets
- Interconnects with other lines

RIN Created

No RIN
RFS2 Renewable Fuel Mandates

A  Total Volume of ALL Renewable Fuels in Mandate

B  Sub to A = Total Volume of Advanced Biofuels

Bn Sub to B = All other Advanced Biofuels combined

C  Sub to B = Cellulosic Biofuels

D  Sub to B = Biomass Base Diesel

* After 2022 (and after 2012 for Biomass-Based Diesel (BBD)), EPA will set the applicable volumes for each of the fuel categories, taking various economic, environmental and energy security factors into consideration. EISA specifies that the continuing BBD mandate cannot be less than one billion gallons per year.
What is in biogas?

**Average composition of municipal anaerobic digester biogas**

<table>
<thead>
<tr>
<th>Components</th>
<th>Wastewater treatment plants sludge</th>
<th>Vehicle Fuel</th>
<th>Renewable Natural Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane CH₄ % vol</td>
<td>60-75</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon Dioxide CO₂ % vol</td>
<td>33-19</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Nitrogen N₂ % vol</td>
<td>1</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Oxygen O₂ % vol</td>
<td>0.5</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Water H₂O % vol</td>
<td>6</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Hydrogen Sulfide H₂S ppm</td>
<td>1000 - 4000</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Siloxane SiOₓ ppm</td>
<td>0-2000</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
So What?

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- $/dktherm average
- 2.5 $/RIN value
- 3.5 natural gas cost
D3 Values

Qualified RIN

- Market is moving to Q-RIN’s which require a Qualified Assurance Plan
- Verification of feedstocks, verification that volumes produced are consistent with amount of feedstocks processed, and verification that RINs generated are appropriately categorized and match the volumes produced
- Annual audits of renewable fuel production facilities, including minimum frequency, site visits, review of records, and reporting
- Define the conditions under which a regulated party could assert an affirmative defense to civil liability for transferring or using an invalid RIN
- Identification of the party who are responsible for replacing invalid RINs with valid RINs and the timing of such replacement
- A limited exemption for calendar years 2014, 2015, and 2016 that exempts two percent of a party’s Renewable Volume Obligation (RVO) from the replacement requirement if the RINs were used for compliance and were verified through a QAP
- Changes to the EPA Moderated Transaction System (EMTS) that would accommodate the quality assurance program
Export Paths

1. Pipeline injection
2. On site consumption
3. Trucked “Fuel Mule”

Lafayette, IN

Atlanta, GA

http://www.ultimatecng.com
Tips

• Get a renewable fuel consultant
• Gas interconnection requirements vary widely
• Secure long term off-take agreement
• Use standard contract for off-take agreement
• Find local fleets for regional partnerships
• Flare gas can be used for heating
• Watch co-digestion. Other feedstocks can push you to D5
• Onsite consumption may have lower quality threshold than pipeline injection
Sources


• American Biogas Council https://www.americanbiogascouncil.org/

• Coalition for Renewable Natural Gas http://www.rngcoalition.com/
Thank you
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