

Renewable Natural Gas Delivery Options

Getting your RNG to Market

March 6, 2018

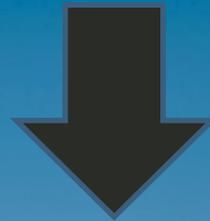
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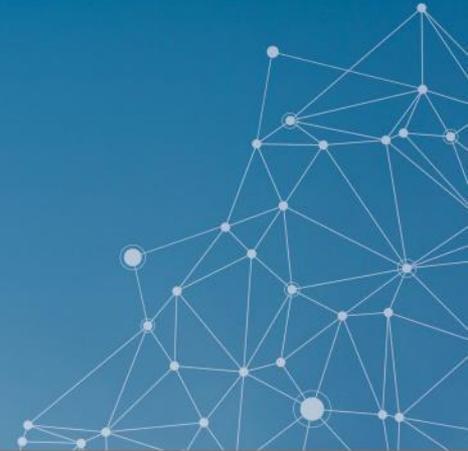
Denver, Colorado • March 5-7, 2018



Biogas



MONEY!



Options to Deliver RNG

- Pipeline Injection
- Trailer Transport
- Direct Use
- Liquid Natural Gas

Challenges:

- RIN and LCFS Verification
 - Financial Considerations
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Why Have Options?

- Maximize Sale/Use of RNG
- Financial Incentives / Concerns
- Multiple Sources or Uses of RNG
- Difficult Contract Negotiations
- Location of RNG
- Size Matters: 1,000 scfm of LFG can Produce 6,500 GGE/day



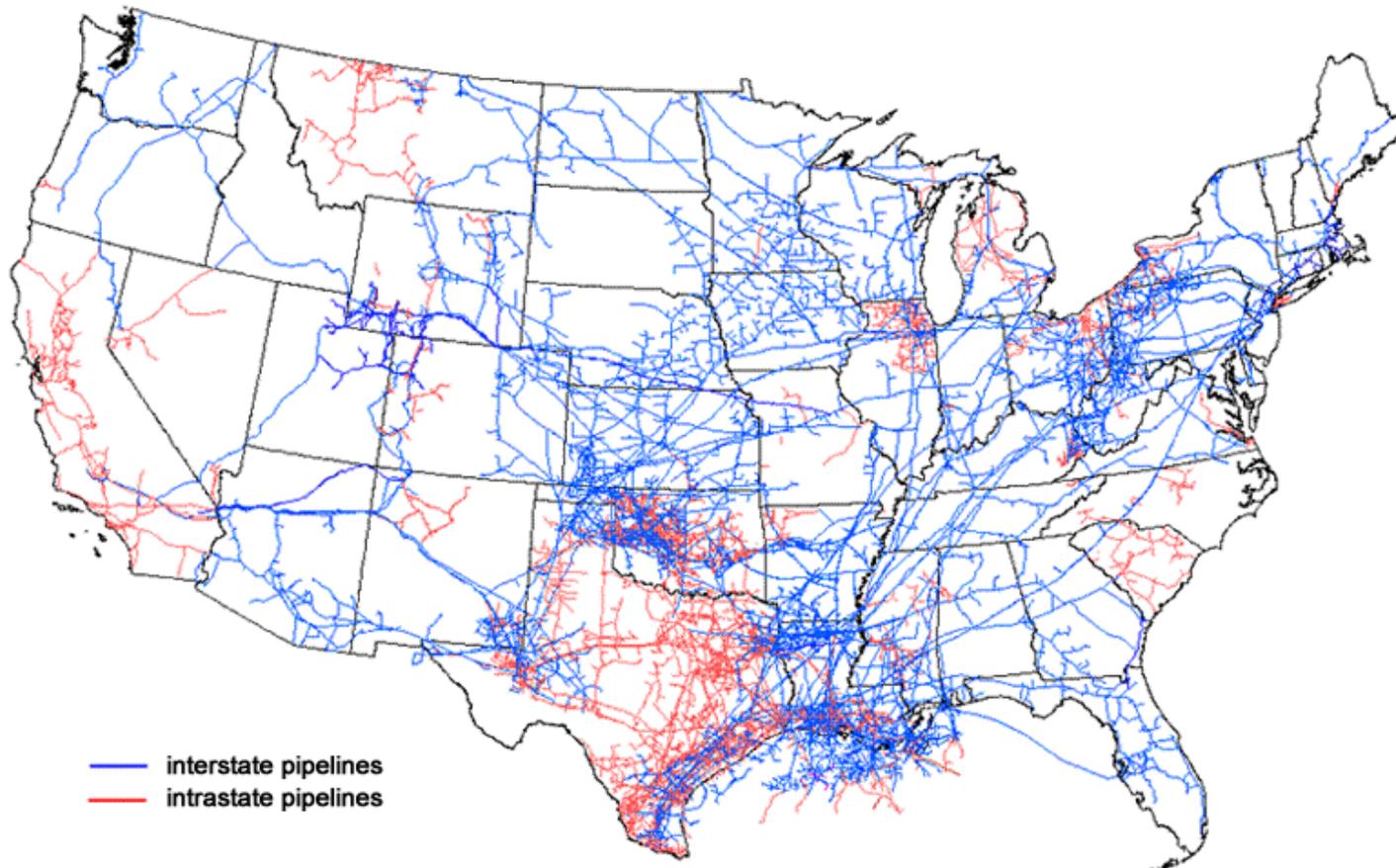
Interstate Pipeline Connection

- Pipeline Interconnection
- Compression Requirements
 - 500 to 1,500 PSI
- Metering Station Requirements
 - Gas Chromatograph and Flow Meter
- Problems with Non-Conforming RNG
- Right of Way Negotiations for Connecting Pipeline



Pipeline Injection

Map of U.S. interstate and intrastate natural gas pipelines



Source: U.S. Energy Information Administration, *About U.S. Natural Gas Pipelines*



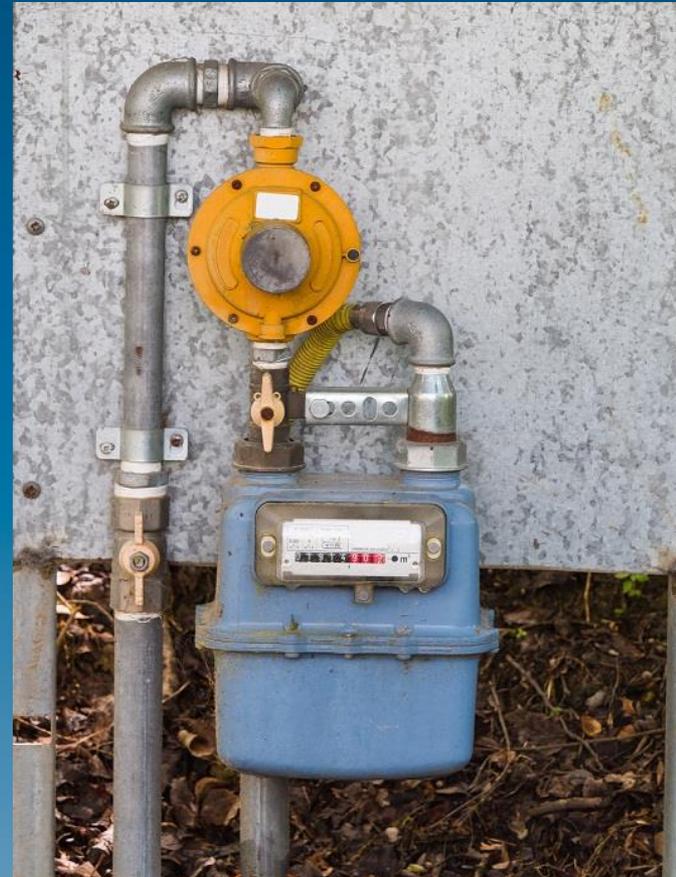
Interstate Pipeline Connection

- \$1 - \$4 million
- Terms Can Negotiate
- Connection Tee, Metering Station, Gate Valve, Up Front Fees
- 1 to 2 Year Timeline to Permit and Construct



Distribution Pipeline Connection

- \$500,000 to \$1,500,000
- Terms Can Negotiate
- Perceived as High Risk by Local Utility
- Connection Tee, Metering Station, Gate Valve,
- 1 to 2 Year Timeline to Permit and Construct



Transport RNG to a Natural Gas Pipeline

- Interstate or Distribution Pipeline
- Injection Point on a Pipeline requires a Decant and Metering Station
- RNG Verification Concerns (proof of source of RNG required)
- RIN Verification at the injection point



Truck Transportation (Tube Trailers)

Trailer Capacity 3,000 to 4,000 GGE



Truck Transportation (Tube Trailers)

Decant Station and Heater



Transport RNG to a CNG Fueling Station

Tube Trailer can be used as storage capacity for a Fueling Station (3,000 GGE of RNG storage)

- Metering Concerns, proof of RNG source for RIN verification



Direct use of RNG as CNG on-site

BioCNG™ system at St Landry Parish, LA



Direct Use as CNG

Atlas Disposal Fleet Fueling on BioCNG™



Direct use as CNG

School Bus Fleet Fueling on BioCNG™



Direct Use as CNG

BioCNG™ 100 system with GoFlo™ Fueling

- 100 scfm of biogas = 600 GGE vehicle fuel/day
- Fuel up to 55 trucks per day (small vehicles) or 8 large trucks per day
- \$1 Million package



Dane County RNG Project 2,000 scfm

- Breaking Ground - March 2018
 - Sized for 3,000 scfm of LFG
 - Pipeline Interconnection On-Site
 - Tube trailers from Off-Site RNG Sources
 - Potential to handle 30,000,000 GGE of RNG per year at this facility
 - Requires 3 metering stations for gas quality and quantity
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Dane County RNG Project



Dane County RNG Project



Summary

- **Three real options to get RNG to the market**
 - Pipeline Connection
 - Truck Transport
 - Direct Use
 - **Plan Early**
 - **Options may be limited due to technical or financial reasons**
 - **Get help (no need to reinvent the wheel)**
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Thank you!



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