Biogas

MONEY!
Options to Deliver RNG

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

Challenges:
• RIN and LCFS Verification
• Financial Considerations
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
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)
Thank you!

Mark Torresani, PE
Vice President/RNG Initiative Lead
Mark.Torresani@tetratech.com

Bill Bloomenkranz
Project Engineer-RNG
Bill.Bloomenkranz@tetratech.com