

Building Blocks of RNG Projects

A Look At Drivers Specific to
Renewable Transportation Fuel
Projects

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The Coalition for Renewable Natural Gas

- * National Non-Profit
- * Industry Association
- * Dedicated to Advancement of RNG
- * Membership Based
- * Public Policy Focus
- * Relationship Driven

www.RNGCoalition.com



Definitions: Biogas

- * **Biogas** – a mixture of hydrocarbons that is a gas at 60 degrees Fahrenheit and 1 atmosphere of pressure that is produced through the conversion of organic matter.
- * Biogas includes landfill gas, gas from waste digesters, and gas from waste treatment plants.
- * Waste digesters include digesters processing animal wastes, biogenic waste oils/fats/greases, separated food and yard wastes, and crop residues.
- * Waste treatment plants include wastewater treatment plants and publicly owned treatment works (EPA, RFS2 Proposed)

Definitions: R-CNG



- * **Renewable Compressed Natural Gas** – biogas that is processed to the standards of pipeline natural gas (biomethane) as defined in 40 CFR 72.2 and that is compressed to pressures up to 3600 psi. (EPA, RFS2 Proposed)
- * Only Renewable CNG that qualifies as renewable fuel and is used for transportation fuel can generate RINs.

Definitions: R-LNG

- * **Renewable Liquefied Natural Gas** - biogas that is processed to the standards of pipeline natural gas as defined in 40 CFR 72.2 and that goes through the process of liquefaction in which the biogas is cooled below its boiling point and weighs less than half the weight of water so it will float if spilled on water. (EPA, RFS2 Proposed)
- * Only renewable LNG that qualifies as renewable fuel and is used for transportation fuel can generate RINs.



Biomethane vs. “Natural Gas”

- * Biomethane is primarily methane (95%+ CH₄)
- * Fossil Natural Gas is primarily methane (80%+ CH₄)
- * Also Carbon Dioxide (CO₂), Water (H₂O), Nitrogen (N), Oxygen (O) and Hydrogen Sulfide (H₂S)
- * Major Difference Source: What’s decaying? T-Rex or last night’s Tuna Sandwich?



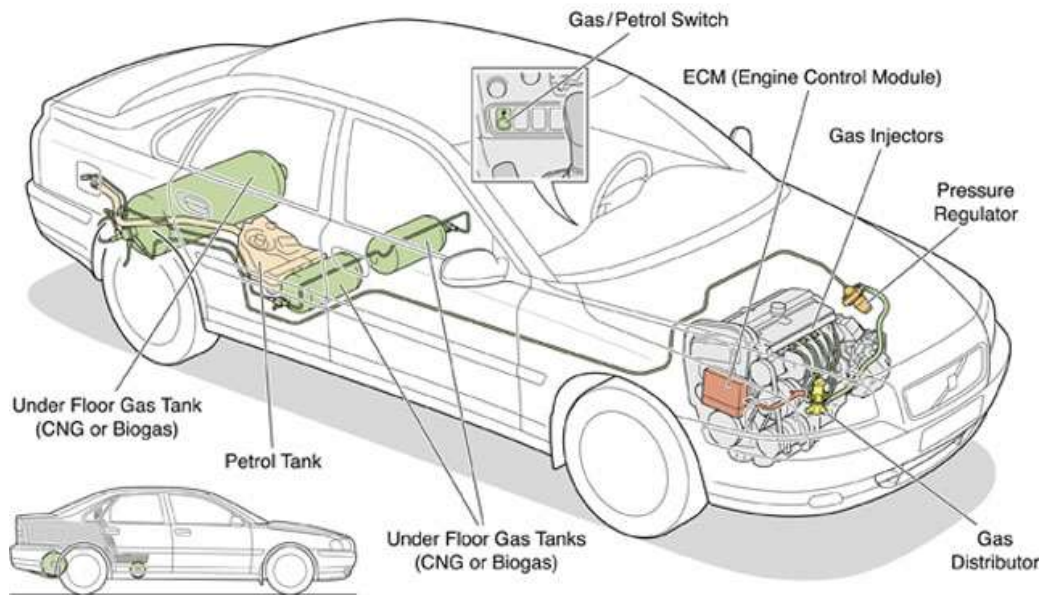
Potential End Uses

- * End Use determines Policy Drivers
- * Electricity Generation (RPS)
- * Thermal Heating (RPS, APS)
- * Transportation Fuels (RFS₂, LCFS)



Transportation Fuel

Bi-Fuel System (CNG, Biogas)



Volvo S80

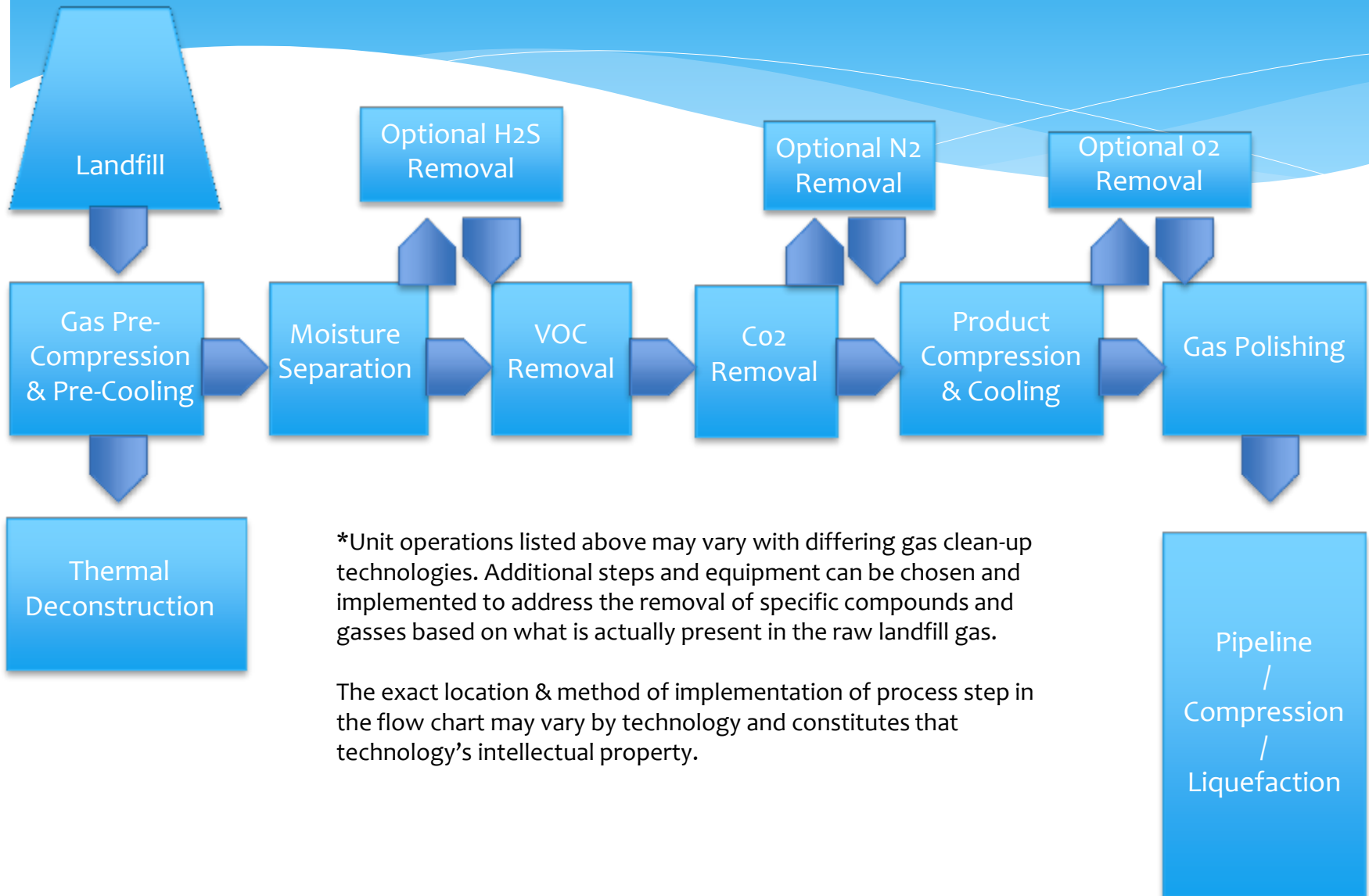
- * 16.4 million natural gas vehicles worldwide (2012)
- * 250,000 natural gas vehicles in the U.S. (2012)
- * Growing every day

Gas Cleanup & Compression

- * Biogas (depending on source) has approx. 50-55% methane and approx. 40% CO₂
- * Need to Hit:
- * Vehicle Fuel: 90%+ methane, very low water, some impurities ok.
- * Pipeline: 97%+ methane, ultra low impurities, and high BTU (970 MMBTu for example; depends on utility)



Gas Cleanup & Compression



*Unit operations listed above may vary with differing gas clean-up technologies. Additional steps and equipment can be chosen and implemented to address the removal of specific compounds and gasses based on what is actually present in the raw landfill gas.

The exact location & method of implementation of process step in the flow chart may vary by technology and constitutes that technology's intellectual property.

What Are The Building Blocks?

- * Predictable Return on Investment
- * Proven People
- * Proven Processes
- * Proven Technologies
- * Public Policy Drivers
- * Mitigated Risks



Predictable Return On Investment



- * Financing – Investors like to know they are getting their money back
- * Taxpayers like to know that you are not flushing money down the drain
- * Good News - With good public policy in place the financing can and does work

Predictable Return On Investment

- * RFS2 creates the RIN market [when you produce renewable fuel and dedicate that fuel for transportation use you generate a commodity that can be traded (sold) in the market.]

- * 13 RINs per MMBTu



- * \$0.30 - \$1.00 per RIN

- * RIN Value: More on this later... Sticking to basics

- * Natural Gas Price (\$4.00 MMBTu) plus RIN Value (\$3.90 - \$13.00 per MMBTu) = \$7.90 - \$17.00 MMBTu (plus LCFS Credits if applicable).

Proven People



ELEMENT MARKETS



- * Developers – General Contractors, they’ve built a house before (don’t hire your cousin Vinny)
- * Engineers – Make The Mechanics Work, if biogas goes in one end, what comes out the other?
- * Marketers – RINs, LCFS Value; Money in your pocket



FORTISTAR



DTE Energy
DTE Biomass Energy



DriveGreen, LLC

VNG.co

Civil & Environmental Consultants, Inc.



Proven Process / Technologies

- * No Science Projects
- * Equipment that does what it's designed to do
- * Equipment for Compression, Sulfur Removal, Refrigeration or Drying, Solvency,
- * Membrane or Adsorption Process, Odorization, Thermal Oxidizer for Contaminants



Mitigated Risks

- * Neither my comments today nor this presentation constitute legal advice or create an attorney-client relationship
- * Fixed Cost Agreements
- * Performance Guarantees
- * Liquidated Damages Clauses
- * Long Term Contracts

Public Policy



- * Public Policy Drives Demand
- * Demand Drives Price
- * Renewable Fuel Standard – Administered by the EPA, Regulations ensure minimum level of transportation fuels sold in the U.S. come from renewable sources
- * Low Carbon Fuel Standards – State Legislation or Regulation; usually part of a global warming solution law / carbon reduction plan



Public Policy

- * RFS created by the Energy Policy Act of 2005
- * Expanded under the Energy Independence and Security Act of 2007
- * Washington's LCFS created in 2009
- * California's LCFS created from 2006 law, gets teeth in 2014
- * Comments to EPA on RFS changes submitted yesterday (July 15)
- * Public Policy Drives Demand; Demand Drives Profit
- * It is Being Created, Shaped and Implemented Now
- * Don't sit on the sidelines...

**GET
INVOLVED!**

Final Shameless Plug

- * Join The Coalition For Renewable Natural Gas
- * Join us at *RNG 2013: Fuel, Heat, Power & Policy Conference*



- * December 9-11, 2013
- * San Diego, California
- * RNGCoalition.com
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