

Advanced Energy Conference 2018

Greening the Natural Gas System





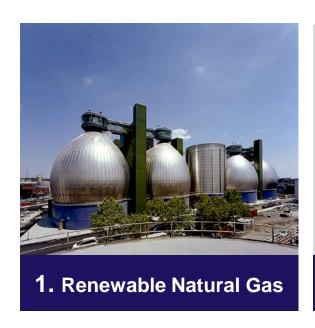


March 27, 2018 Donald Chahbazpour

Decarbonization of Gas

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The carbon footprint of natural gas is not static and is declining







What is Renewable Natural Gas (RNG)? nationalgrid

Current definition

 Pipeline-quality gas produced from biomass – sources of biomass include wastewater treatment plants, food waste, landfills, livestock manure, municipal solid waste, agricultural residues and energy crops.

Emerging / evolving definition

 Hydrogen and methane produced from biomass AND renewable electricity

Renewable Natural Gas National Potential (Biomass only)

Study by American Gas Foundation (released Sept. 2011)

Finding: Under a reasonable long-term scenario, Renewable Gas could be used to meet the natural gas needs of half of all American homes.

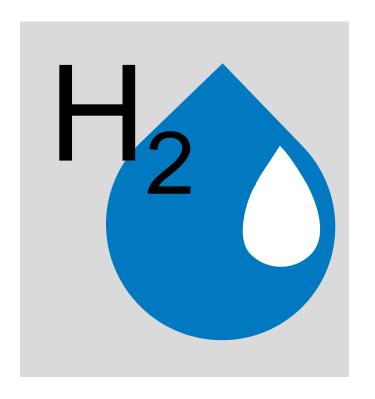
Category	AGF Study Scenario		
	Non-Aggressive	Aggressive	Technical Potential
Energy Potential (billion cubic feet /yr)	967	2,485	9,450
Potential as a Percentage Overall Demand*	4%	10%	40%
CO ₂ Abatement (million tons/yr)	57	146	556
Direct Jobs Created (low – high range)	8,825 – 32,189	22,692 – 82,765	86,732 – 316,338

^{*} Based on a national usage of approximately 24 TCF of natural gas (for 2010), source EIA

2. Hydrogen Blending

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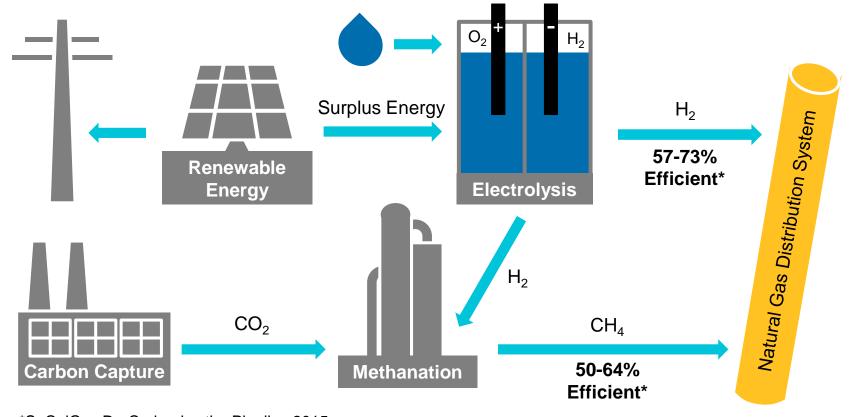
- Injecting hydrogen into the existing natural gas distribution system to supplement methane
 - Emission from combustion is H₂O
 - 10-20% blend without impact to end-use equipment*
 - Enables initial deployment of H₂ without the need for costly infrastructure investments
 - Significant reduction of GHG emissions if H₂ is produced from biomass, wind, solar and nuclear power



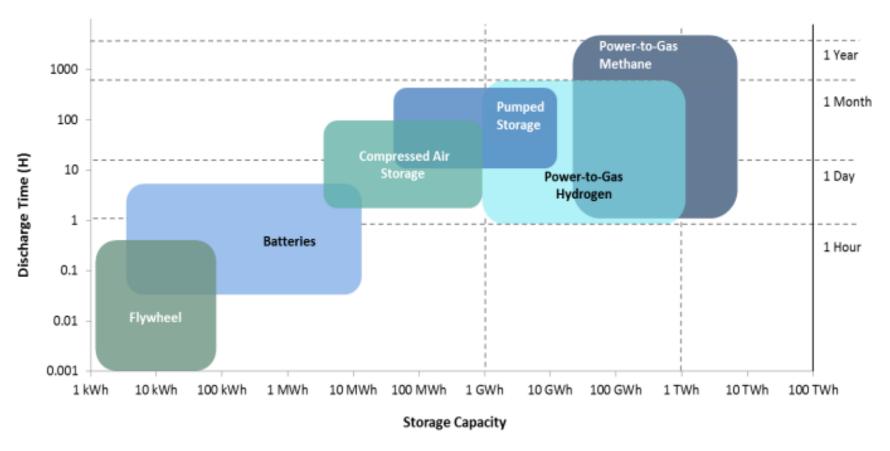
3. Power-to-Gas

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- The conversion of excess renewable energy into a gas fuel through electrolysis
 - Produces H₂ and can be methanated to produce CH₄



Storage capacity of power-to-gas compared to other storage methods



Source: ITM Power plc

Pathway to Sustainability

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Reduce Methane Emissions

Integration of latest technology to quantify and prioritize leaks, driving towards an industry goal of 1% leak rate or less by 2025

Gas REV in NY

Promoting innovation in the gas business MicroCHP, Demand Response

Renewable Natural Gas

Pipeline quality gas derived from biomass, utilizing existing waste streams

2018

2030

Hydrogen Blending

Injecting 10-20% hydrogen into existing natural gas system

Power-to-Gas

Utilizing excess renewable electricity to produce gaseous fuel for long term storage

Carbon Capture & Storage

Technologies enabling negative emissions

80x50