Renewable Natural Gas: It's Benefits & Modelling Policy Driven Production

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Abstract

Renewable natural gas (RNG) is a valuable commodity upgraded from biogas produced by anaerobic fermentation in landfills, wastewater treatment facilities, livestock manure lagoons, etc. It is composed primarily of methane (CH_4), but it generates fewer greenhouse gas emissions across its lifecycle than conventional natural gas. Producing RNG is significantly more expensive than conventional gas; however, RNG production has increased dramatically in recent years. Concerns still exist about RNG use as a hydrocarbon fuel, but RNG can play a role in greenhouse gas emission reduction strategies through production pathways that have methane mitigation potential.

Modelling a Policy Driven Market

RTI International was recently commissioned to develop a production and greenhouse gas (GHG) emission abatement model on RNG in the United States.

Model Challenges:

- Understanding how policies at the state and federal level interact and drive RNG production.
- Operationalizing policy mechanisms into a usable quantitative values per unit of RNG produced.

Policy model inputs for the Renewable Fuel Standard and Low Carbon Fuel Standard cannot be shared at this time but were created after an in-depth literature review and using publicly available data.

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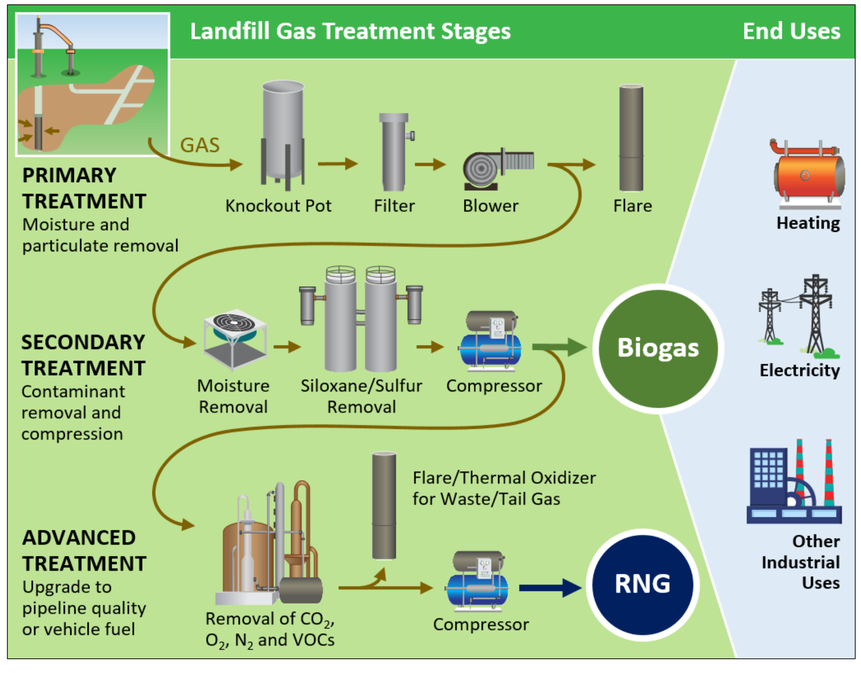

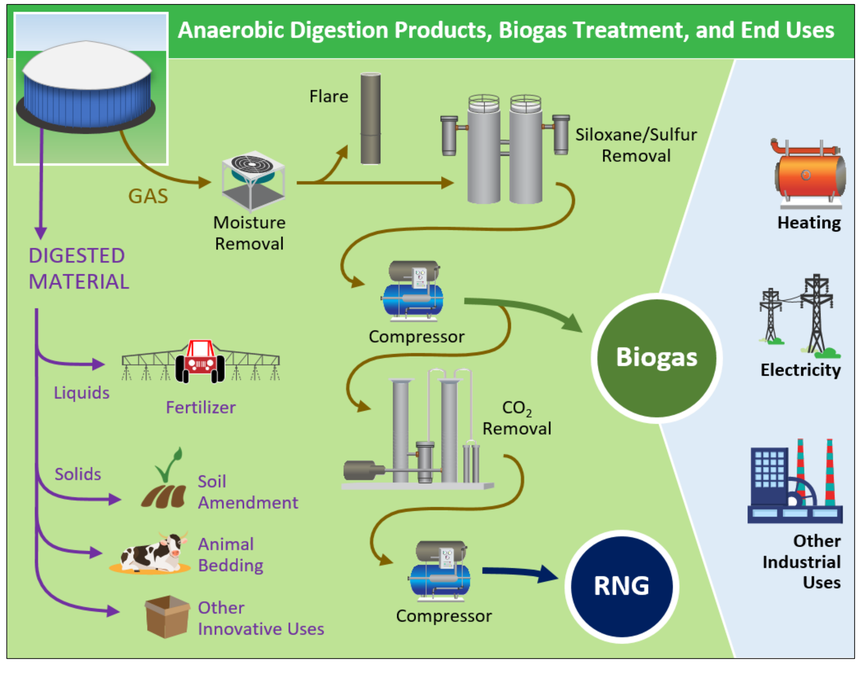

Above images from: EPA Landfill Methane Outreach Program (LMOP). https://www.epa.gov/lmop/renewable-natural-gas

Many Benefits, Important Limitations

Benefits:

- Life cycle emissions of methane are low, or possibly negative, depending on the source.
- Reduces long-carbon cycle emissions by displacing conventional natural gas use.
- Creates valuable secondary products such as digestate (effectively organic fertilizer).
- Reduces noxious odors and limits/prevents water contamination when replacing open air manure lagoons with enclose anaerobic digesters.
- Can be used to create hydrogen

Limitations:

- Projects are expensive (millions/tens of millions of dollars).
- Markets that rely on policy for support are fragile – poorly structured policy (initially or due to regulatory/legislative action) may limit demand or lead to "boom and bust" cycles.
- May lock-in or prolong dependence on hydrocarbon-based energy.

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