The Environmental Benefits of RNG

The environmental benefits of producing and using renewable natural gas (RNG) include improved waste management, energy decarbonization, greenhouse gas (GHG) mitigation, improved air and water quality, and the production of non-chemical fertilizers.

Improved Waste Management

RNG is made from wastes that are inevitable by-products of plant, animal, and human activity. In an oxygen-free environment, organic wastes (like food waste and sewage) naturally release a methane-laden biogas as they decompose (a process called "anaerobic digestion"). Capturing biogas and converting it to clean-burning, high-value RNG incentivizes more thorough, holistic management of organic waste.

The scope of the organic waste problem is huge. The World Bank projects the total volume of solid waste to grow 69% by 2050.[1] According to the International Energy Agency, the organic feedstocks that can be used to produce sustainable RNG will grow 40% by 2040.[2]

A significant portion of the biogas produced by decomposing organic wastes — and the methane it contains, which is 80x more potent as a GHG than CO_2[3] — will vent into the atmosphere unless it is captured. Once captured, it can be processed into RNG, which can be used as energy for transportation, heating, or electricity production; as a feedstock for making hydrogen; or to manufacture of materials that would otherwise use conventional natural gas.

RNG Helps Mitigate GHG Emissions

CO_2 from energy consumption, and methane from anthropogenic waste, are two of the largest sources of GHG emissions in the U.S.[4] RNG can reduce emissions from *both these sources at once*, making it a unique, multi-benefit energy resource.

Depending on the waste from which it's produced, the lifecycle **Carbon Intensity** (CI)[5] of RNG ranges from a 20%+ reduction compared to conventional natural gas to *significantly carbon-negative* (i.e., producing the fuel prevents more emissions than come from using it).[6]

In addition, RNG is composed of *biogenic carbon*. This means that carbon emissions released from using it are already part of the natural carbon cycle[7] — as opposed to burning fossil fuels, which actually puts carbon that was previously sequestered underground *back into the environment*.

---

[1] Compared to 2018. Kaza et al. (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.
[2] IEA. (2020, March). Outlook for Biogas and Biomethane.
[3] Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2021: The Physical Science Basis," page 1034.
[4] U.S. EPA, "Greenhouse Gas Emissions – Overview of Greenhouse Gases."
[5] Life Cycle Accounting (LCA) measures all emissions from the production, transportation, distribution, and consumption of a fuel. "Carbon intensity" quantifies GHG emissions of a fuel in grams of CO2-equivalent per megajoule of energy consumed (CO2e/MJ).
[6] Argonne National Laboratory, "Renewable Natural Gas for Transportation," 2021.
[7] UC Davis. (2020, August 6). Science & Climate Definitions – Biogenic Carbon.

THE COALITION FOR RENEWABLE NATURAL GAS

Under current GHG reporting protocols for business, CO_2 emissions from RNG are considered *carbon neutral*.[8] Corporate RNG consumers achieve 100% reduction in "Scope 1" (direct) CO_2 emissions, and RNG with a CI score lower than zero (carbon negative) can achieve additional GHG benefits outside of Scope 1.

RNG Improves Air Quality

RNG mitigates the nitrogen oxides (NOx) and particulate matter (PM) that cause smog, offering significant air quality improvements compared to fossil fuel energy alternatives.[9,10]

Current commercially available natural gas engine technology is 90% cleaner than the cleanest diesel engine, and 90% cleaner than EPA's current NOx requirement.[11] This means that use of RNG in heavy-duty on-road transportation achieves substantial reductions in NOx and PM2.5 emissions compared to diesel.[12]

RNG Improves Water Quality

The anaerobic digestion process that produces biogas is a cost-effective treatment of livestock manures and sewage biosolids at thousands of facilities across the U.S.[13] Nitrogen and phosphorus are contained and controlled during the anaerobic digestion process, decreasing runoff into ground water and other water resources.[14]

Livestock manure that has been digested is more readily absorbed by soil than unprocessed manure, again reducing run off and contamination of water resources.

Anaerobic digestion reduces pathogen levels up to 99% compared to undigested manure.[15]

RNG Creates Useful Products from Waste

The anaerobic digestion process that produces biogas converts nutrients contained in organic wastes into a form more accessible by plants than, for example, raw animal manure, making digested manure more effective as a fertilizer.[16] In addition to reducing nitrogen and phosphorous run-off, as described above, this also allows farmers to reduce their use of chemical fertilizers.

Solids left over from the AD process can be recycled for use as animal bedding on farms, and even incorporated into building materials.[17]

---

[8] WRI. (2004, March). The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard.
[9] US EPA, "Renewable Natural Gas."
[10] Advanced Clean Tech News, "RNG is the Fast Track to Cleaner Air in California."
[11] Ibid.
[12] M.J. Bradley & Associates. (2020, February). The Role of Renewable Biofuels in a Low Carbon Economy.
[13] USDA, US EPA, US DOE. (2014, August). Biogas Opportunities Roadmap.
[14] Ibid.
[15] Ibid.
[16] U.S. EPA. (2020, August 18). The Benefits of Anaerobic Digestion.
[17] Farm Energy Extension, Uses of Solids and By-products of Anaerobic Digestion, April 2019.