

Renewable Natural Gas

Renewable natural gas (RNG) from biomass helps to meet America's growing demand for a low-carbon, affordable, and reliable fuel. RNG is fully compatible with conventional natural gas and the existing pipeline infrastructure.

RNG is made by capturing and refining biogases released from decomposing organic waste material. Unutilized agricultural byproducts such as manure and plant matter emit methane while they decay, with agriculture accounting for 36% of methane emitted annually in the United States.¹ Using these biogases as RNG feedstock directly displaces fossil fuel consumption and prevents the greenhouse gas methane from entering the atmosphere. RNG is considered a carbon neutral fuel, with even greater benefits when it is produced from organic waste that would otherwise decay and create methane emissions.² Since RNG is ready to use in existing natural gas infrastructure, it can be injected into pipelines to immediately begin reducing natural gas carbon content.



In 2021, 97 U.S. RNG projects used agriculture-derived feedstocks³

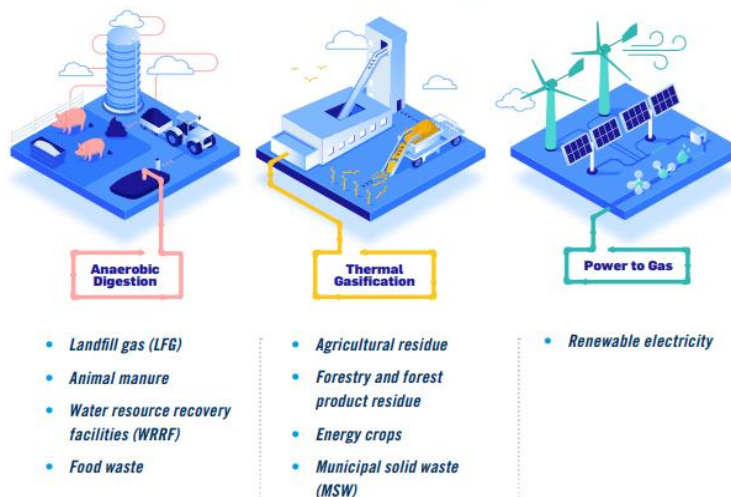
Feedstocks and Processes

RNG is derived from various biogenic feedstocks including wastewater sludge, animal manure, food waste, agricultural residues, forest product residues, municipal waste, and energy crops.

Three processing systems can produce RNG: 1) anaerobic digestion, 2) thermal gasification, and 3) power-to-gas. All are followed by a refining process, which renders the fuel functionally-equivalent to conventional natural gas.

Anaerobic digestion uses microbes to break down organic matter and converts the resulting organic acids into methane gas. This process is well-suited to “wet” biomass such as food waste, animal manure, and wastewater sludge. Conversely, thermal gasification is a high-temperature process that completely dries biomass, converting it into gas and char. Energy crops are a “dry” feedstock that are expected to be utilized more frequently over the next two decades.

RNG Production Technologies



Source: [American Gas Foundation, “Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment”, 2019](#)

¹ U.S. EPA, *Methane Emissions in the United States: Sources, Solutions, & Opportunities for Reductions*, 2019

² SoCalGas, *What is Renewable Natural Gas?*

³ U.S. EPA, *Renewable Natural Gas*, 2022

Power-to-gas technologies use electrolysis to convert renewable electricity into hydrogen or methane for natural gas pipeline injection.

Impact of Renewable Natural Gas

RNG is interchangeable with conventional natural gas and can be used in residential, commercial, industrial, and transportation applications. In high feedstock availability scenarios, RNG production could be enough to cover 59 percent of industrial or 93 percent of residential natural gas demand.⁴ Use of RNG can make meaningful progress towards decarbonization, especially in hard-to-decarbonize sectors such as heavy duty transportation or industrial facilities that require high-temperature heat for industrial processes could use RNG to reduce their carbon footprint.

RNG in the Transportation Sector

Using RNG in the transportation sector has the dual benefit of reducing greenhouse gas emissions and significantly improving air quality, as RNG produces less nitrous oxide (NO_x) and particulate matter emissions compared to traditional gasoline and diesel fuels. In 2021, RNG facilities produced over 59 million MMBtus of gas, which is enough to fuel over 390,000 homes energy use for one year.⁵ State and local governments across the country are passing low-carbon fuel standards, which provide financial incentives for low-carbon fuels to support increased use of RNG in the transportation sector.

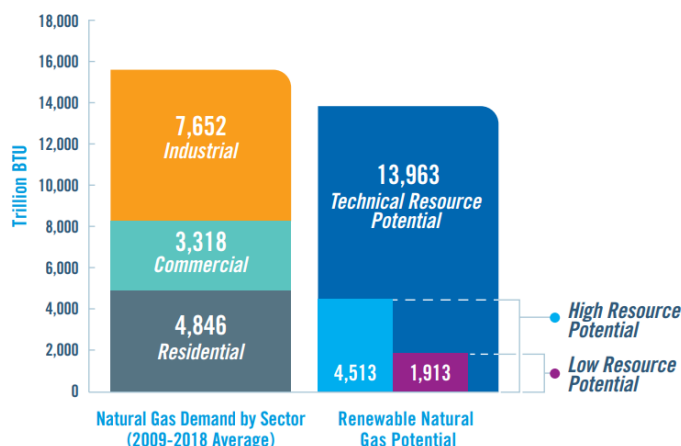


Compared to diesel, RNG can reduce 95% of GHG emissions on a lifecycle basis⁶

Next Steps for RNG

Demand for RNG is growing as industries can use this fuel to reduce emissions across their entire supply chain. In cases where methane from biogas would have been released into the atmosphere, RNG can go beyond carbon-neutral to being carbon negative.⁷ The carbon reduction impact of RNG can be even greater when carbon-capture technologies are installed at points of use. As RNG production increases, the fuel will be used primarily to decarbonize the transportation, industrial, and utility sectors. RNG will play an important role in decarbonization strategies across the United States, but resources are likely to be limited compared to the demand for carbon-neutral fuels. Hydrogen and power-to-gas options will offer additional fuel-based pathways to carbon neutrality for these sectors.

RNG Resource Potential



Source: [American Gas Foundation, "Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment", 2019](#)

⁴ American Gas Foundation, [Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment, 2019](#)

⁵ U.S. EPA, [Greenhouse Gas Equivalencies Calculator, 2022](#)

⁶ Argonne National Laboratory, [Renewable Natural Gas \(RNG\) for Transportation, 2020](#)

⁷ [Advanced Clean Tech News, Is RNG a California-Only Fuel? 2020](#)