

# Understanding Renewable Natural Gas

## What is RNG?

Renewable Natural Gas (RNG) is produced from the “biogas” that is released by decomposing organic material in everyday waste streams, such as food waste, sewage, and manure from farm animals. Biogas starts out as a mixture of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>). Treatment processes remove the CO<sub>2</sub> (and some other trace constituents) to produce RNG that is mostly methane (~95%), meets quality standards for pipeline injection or use as transportation fuel, and is *a low-carbon or even carbon-negative alternative to conventional (fossil) natural gas.*

## What is the Difference Between RNG and Conventional Natural Gas?

RNG is produced by capturing the methane—a potent greenhouse gas (GHG)—that is produced by the decomposition of organic waste streams inevitably produced by normal human activity. Capturing this methane keeps it from escaping into the atmosphere, where it is estimated to trap heat 80x more effectively than CO<sub>2</sub>, significantly contributing to climate change.<sup>1</sup> Conventional natural gas is collected from limited fossil resources that would otherwise remain sequestered within the earth; production of RNG captures methane that is already in the environment, conventional natural gas adds methane to the environment.

Using RNG to displace conventional natural gas reduces GHG emissions from both organic waste generation and fossil fuel consumption. Blending RNG with conventional gas helps dilute the emissions of the gas system overall.

## Where is RNG Used?

RNG is a flexible renewable energy resource used in thermal applications, to generate electricity, and as a transportation fuel. It can also be used to produce renewable hydrogen, renewable jet fuel, and bio-based chemical feedstocks. RNG is a drop-in replacement for conventional natural gas, providing a pathway to decarbonization wherever demand for natural gas exists. Under a high-development scenario, the United States could produce over 1.4 billion MMBTU of RNG from organic waste feedstocks by 2040.<sup>2</sup> That’s the equivalent of nearly 10.8 billion gallons of diesel fuel.

### **Thermal:**

- Natural gas represents a significant portion of energy consumption in the U.S. residential (23%), commercial (20%), and industrial (34%) sectors.<sup>3</sup>
- RNG is a replacement for natural gas in all thermal applications, including furnaces, boilers, cooktops, and industrial processes.
- Blending RNG with conventional gas in existing infrastructure can provide a flexible opportunity for decarbonization in all major sectors.
- RNG is a near-term complement to electrification in sectors where complete fuel switching is potentially decades away.

<sup>1</sup> Intergovernmental Panel On Climate Change (2021). [Climate Change 2021: The Physical Science Basis](#), page 1017.

<sup>2</sup> American Gas Foundation (2019). [Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment](#), p. 14.

<sup>3</sup> U.S. EIA. (2022, February 23). [Natural Gas Explained - Use of Natural Gas](#).

- RNG (and renewable hydrogen) are the only options for decarbonizing applications where cost-effective methods of electrification do not currently exist.

### **Electricity:**

- Fossil natural gas fuels 40.5% of utility-scale electricity generation in the United States.<sup>4</sup>
- RNG is a low-emissions, sustainable alternative for generating dispatchable power, complementary to intermittent renewable sources like wind and solar.
- RNG can generate electricity on-site at the RNG production facility, or remotely at a power plant.

### **Transportation Fuel:**

- RNG can be deployed as a “drop-in fuel” for natural gas vehicles and is, in fact, the lowest carbon vehicle fuel available today.
- RNG can produce electricity for electric vehicles (EVs) and be used to produce hydrogen for fuel cell vehicles.<sup>5</sup>
- Replacement of heavy-duty diesel vehicles with natural gas models running on RNG reduces emissions of nitrogen oxides (NOx) by 90%.<sup>6</sup>
- In 2020, 53% of all fuel used in on-road natural gas vehicles was RNG.<sup>7</sup>

### **Summary Comments**

- RNG mitigates GHG emissions from both waste and energy production/consumption—two of the largest contributors to climate change in the U.S.<sup>8</sup>
- RNG’s most prominent use to date has been in heavy-duty on-road vehicles transportation—a small portion of total vehicles that produces an outside portion of transportation emissions.
- RNG can have not just low emissions, but negative emissions.
- RNG is not an environmental silver bullet, but it is a key component of a decarbonization strategy.

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<sup>4</sup> U.S. EIA. (2022, February 23). [U.S. Utility-Scale Electricity Generation by Source, Amount, and Share of Total in 2020](#).

<sup>5</sup> CARB. (2022, February 23). [LCFS Pathway Certified Carbon Intensities](#).

<sup>6</sup> ICF. (March 2020). [Study on the Use of Biofuels \(Renewable Natural Gas\) in the Washington, D.C. Metropolitan Area](#), at 96.

<sup>7</sup> RNG Coalition. (April 2021). [Decarbonize Transportation with Renewable Natural Gas](#).

<sup>8</sup> U.S. EPA. (2022, February 23). [Greenhouse Gas Emissions - Methane Emissions](#).