

# Renewable Sources of Natural Gas

## Supply & Emission Reduction Assessment Study

### WHAT IS RNG?

Renewable Natural Gas (RNG) is pipeline compatible gaseous fuel derived from biogenic or other renewable sources that has lower lifecycle CO2 emissions than geologic natural gas. With its low to negative life-cycle carbon footprint, RNG has great potential to continue driving down emissions and helping meet our nation's environmental goals.

### ABOUT THE STUDY

As interest and market demand for RNG increases, the American Gas Foundation sponsored this study conducted by ICF, to contribute a fact-based analysis and provide current data to the ongoing policy discussions around renewable natural gas. Published in December 2019, this study provides an estimate of the supply potential of domestic RNG resources, calculates associated costs of RNG production and estimates the corresponding GHG emission reduction potential. ICF presents three scenarios for RNG resource potential, all based upon a 2040 timeline. The study finds that RNG can play a substantial role in lowering emissions, with costs that are lower or competitive with other emission reduction pathways.

### Sizable Emission Reductions

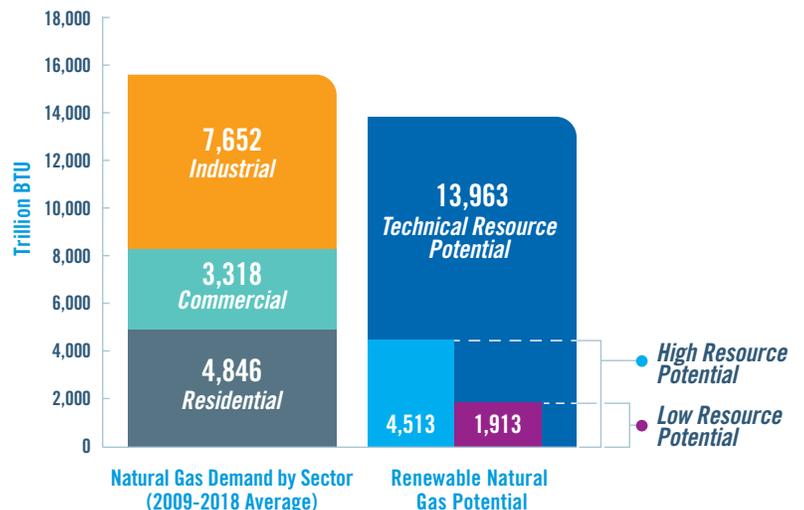
Greenhouse gas emissions (GHG) reduction potential in the low and high resource scenarios ranges between 101-235 Million Metric Tons (MMT) of GHG emission reductions, respectively. Comparatively, the ten year average annual natural gas emissions from the residential sector total 248 MMT.

RNG Could **Reduce Emissions from Natural Gas 95%** in the Residential Sector.<sup>1</sup>



<sup>1</sup> Percentage calculated using ten year average, 2009-2018, EIA natural gas emissions from residential sector consumption.

### RNG Resource Potential

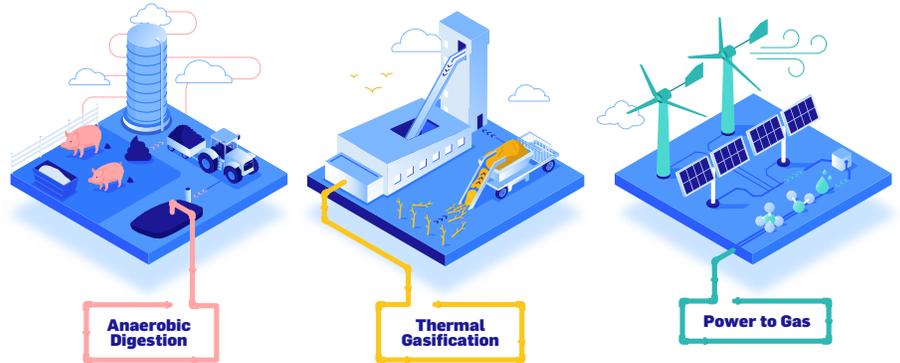


## RNG Feedstocks are Diverse and Potential Supply is Significant

The study focuses on estimating RNG resource potential beginning in 2025 through 2040, and considers nine feedstock sources and three production technologies. Results are presented in three scenarios: low resource, high resource, and a technical resource potential. The study is the first in the U.S. to include power-to-gas as a production technology for RNG.

RNG is a viable emission reduction strategy today and will be in the future because of the diversity of feedstocks and multiple production technologies. The nation's existing pipeline infrastructure network further enables RNG to flow from points of production to centers of demand both near and far.

## RNG Production Technologies



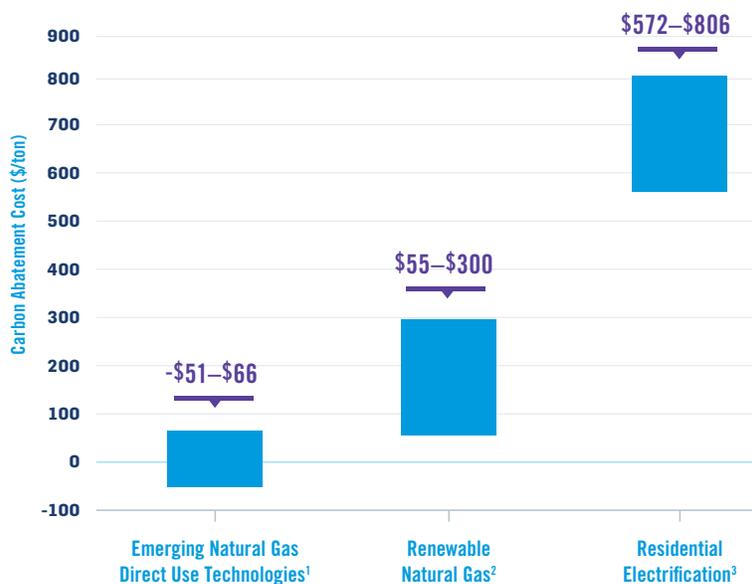
- Landfill gas (LFG)
  - Animal manure
  - Water resource recovery facilities (WRRF)
  - Food waste
- Agricultural residue
  - Forestry and forest product residue
  - Energy crops
  - Municipal solid waste (MSW)
- Renewable electricity

## RNG Represents a Cost-Effective Way to Reduce GHG Emissions

Today, RNG costs more than fossil gas, but as the market matures, production volumes increase, and long-term contracts develop, the opportunities for cost declines are significant. By 2040, ICF expects the majority of RNG to cost between \$7-\$20mmbtu. But as an emission reduction strategy, the cost of RNG is competitive with other technologies.

RNG carbon abatement costs range between \$55-\$300/metric ton CO<sub>2</sub>.

Cost Comparison of Emission Reduction Pathways



<sup>1</sup> Opportunities for Reducing Greenhouse Gas Emissions Through Emerging Natural Gas Direct-Use Technologies, 2019 | <sup>2</sup> Renewable Sources of Natural Gas Supply & Emissions Reduction Assessment Study, 2019 | <sup>3</sup> Implications of Policy-Driven Residential Electrification, 2018