

# Cost-Effective Decarbonization Pathways for Natural Gas

William Kemp, Enovation Partners, +1-941-448-5674, [wkemp@enovationpartners.com](mailto:wkemp@enovationpartners.com)

## Overview

The potential contributions of natural gas to cost-effective pathways for reaching decarbonization goals have often received inadequate attention in long-term energy system analyses. But improved end-use efficiency from existing or emerging technologies could meet near and medium term targets for percentage reductions GHG emissions, and renewable gas from biogas or power-to-gas cycles could help fully achieve 2050 goals for deep decarbonization, all at substantially lower cost than all-electric pathways. This presentation will summarize recent work on the GHG reduction potential and economics of improved gas end-use technologies, as well as the technical and economic potential for renewable gas production in the U.S. The long-term unit costs of these pathways for GHG emission reductions will be compared to other prominent pathways.

## Methods

The study team assembled and prioritized a comprehensive inventory of emerging gas end-use technologies, drawing from gas research institutes, academic experts and industry resources around the world. Potential efficiency and GHG impacts for the high priority technologies were analyzed by end-use pathway. Representative customer use cases were defined across a representative range of customer types, end use mixes and customer value drivers. Net costs and GHG impacts at the customer level were estimated and compared to all-electric solutions. Recent estimates of the technical potential for renewable gas production in the U.S. were updated. Production cost trends with improving technology and larger scale were projected, and competitiveness with other low-carbon energy sources was assessed.

## Results

Over 120 significant new gas end-use technologies were identified and characterized. On a per customer basis, GHG reductions in the range of 25-40% can be achieved in the residential and commercial sectors by integration of these technologies and other efficiency practices across major customer end uses. With future micro-CHP and advanced gas heat pump technologies and an evolution of gas supplies from natural to renewable, GHG reductions of more than the 2050 target of 80 percent can be achieved.

## Conclusions

Policy goals for sustainable energy can be achieved at significantly lower consumer cost through integrating innovative gas solutions into long-term resource planning, while offering customers more choice and improved affordability, reliability and comfort

## References

TBD. Primarily drawing on technology work by Gas Technology Institute and other gas institutes, and on renewable gas work by NREL, UC-Irvine, Engie and other industry sources.