EPRI ELECTRIC POWER RESEARCH INSTITUTE

P201 Back Pocket Insights

KEY INSIGHTS

- **Natural-gas-fired generation can lower the cost of electric sector decarbonization**, a result that is robust to a range of policy and technology assumptions.

- Retaining the **option of using natural gas could be worth about $300 billion** when decarbonizing the electric sector under modeled assumptions. Gas is valuable for providing firm capacity as variable renewable shares increase due to the higher costs of alternatives for on-demand generation.

- Modeled **shares of wind and solar are higher than gas** for most regions and scenarios (52-66% variable renewables for net-zero scenarios vs. 0-19% for gas).

This brief is based on the paper "The Role of Natural Gas in Reaching Net-Zero Emissions in the Electric Sector" published in *Nature Communications* (2022)

Is There a Role for Natural Gas in Net-Zero Emissions Power Systems?

by John Bistline and David Young

New research assesses potential roles for natural gas and carbon removal in deeply decarbonized electricity systems in the United States

Replacing coal with natural gas has contributed to recent emissions reductions. However, there are questions about the near- and long-term roles for gas under net-zero greenhouse gas targets, where emissions produced from natural gas are balanced by carbon removal technologies.

We find that **gas capacity and generation can play key roles**—both during the transition to zero emissions and at the destination—but the degree depends on key uncertainties related to policy design, carbon removal, upstream methane emissions, and transition risks related to technological change.

Existing and new gas can provide firm, flexible capacity that can ensure demand is met every hour as coal retires and electrification increases demand, which helps to **reduce emissions, maintain system dependability, and keep transition costs low**.

Natural **gas generation and capacity are robust elements of least-cost decarbonization portfolios**, though the extent of this role varies (Figure 1). Retaining gas capacity can be compatible with deep decarbonization goals if a net-zero policy framing allows units with carbon removal. Carbon

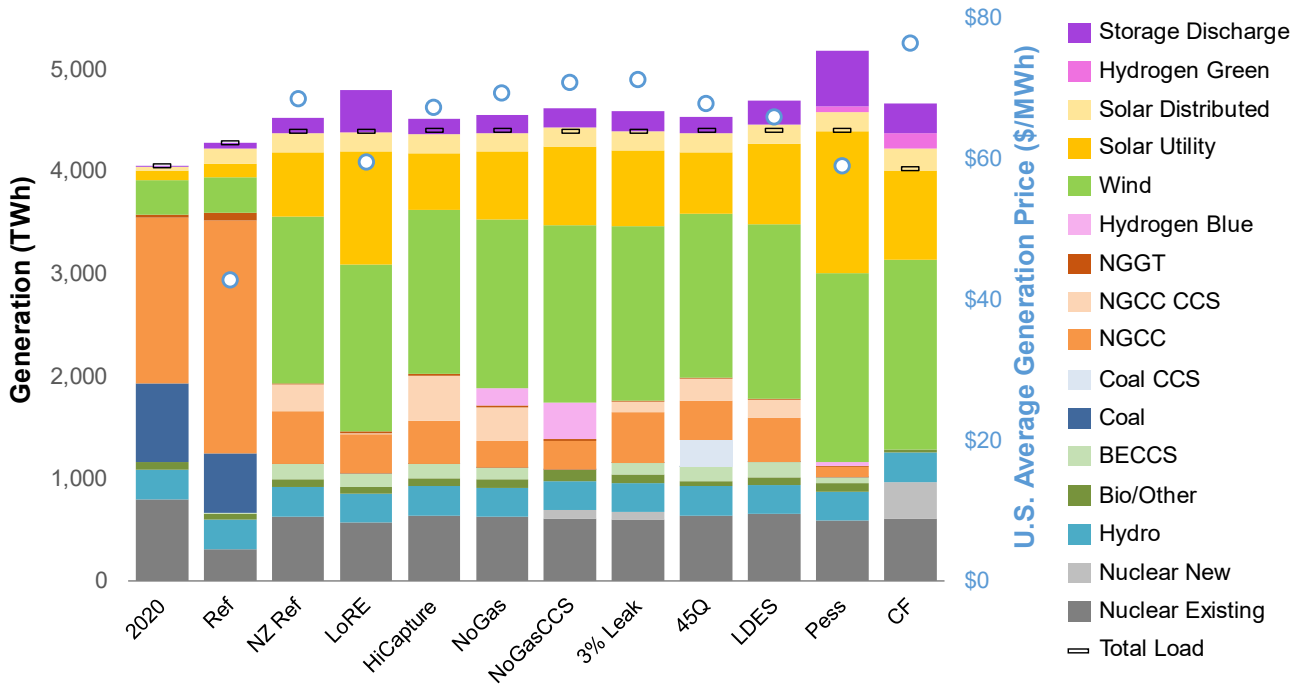

Figure 1. National generation by technology and scenario in 2035. Scenarios assume a net-zero emissions target. Average prices reflect all generation, bulk transmission, carbon removal, and CO_2 transport costs. Detailed scenario descriptions are provided in Bistline and Young (2022).

removal ("negative emissions") provides flexibility to balance renewables, allowing for limited emissions from natural gas, hydrogen, and other resources.

The system value of gas can be estimated by comparing a net-zero ("NZ") scenario with a carbon-free ("CF") one in which gas generation is not allowed. A net-zero by 2035 scenario lowers cumulative capacity investments from 1,300 to 1,000 GW and lowers expenditures from $1.6 to $1.3 trillion relative to a carbon-free scenario, implying **the option value of retaining gas is worth $300 billion** given input assumptions for the analysis.

Wind and solar have the largest generation shares nationally—ranging from 52-66% for net-zero scenarios (compared with 0-19% for natural gas). Accelerating decarbonization entails greater contributions from gas on a relative and absolute basis, and targeting net-zero by 2035 involves lower solar and battery deployment compared with a 2050 target.

There are important **regional differences in the competitiveness of gas**. Regions with lower quality wind and solar resources may have higher gas shares and incur higher costs if decarbonizing without gas, especially in the Eastern U.S.

For more information about deep decarbonization scenarios in EPRI's Regional Economy, Greenhouse Gas, and Energy (REGEN) model, see https://esca.epri.com/usregen

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FOR MORE INFORMATION

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