

INGAA Foundation Flagship Report: The Role of Natural Gas in the Transition to a Lower-Carbon Economy



The INGAA Foundation's flagship study, *The Role of Natural Gas in the Transition to a Lower-Carbon Economy*, is a comprehensive strategic and analytical study that evaluates how natural gas infrastructure will be utilized as we move toward a lower-carbon economy. Ultimately, the study finds that natural gas will remain a significant contributor to the energy portfolio and economic growth in the United States and will play a key role in meeting low-carbon initiatives.

Conducted by Black & Veatch Management Consulting, the study uses detailed modeling and industry subject matter expertise to examine two possible paths, from 2020 to 2040, toward an energy portfolio that relies increasingly on renewable energy.

THE BALANCED FUTURE SCENARIO:

Increased adoption of renewables throughout the U.S. energy mix via a balance of policy initiatives and market economics.

- While natural gas demand from the residential and commercial sectors will grow at a compound annual growth rate (CAGR) of 0.14% and 0.29%, respectively, industrial demand will grow at 0.6% CAGR from increased demand for petrochemical and ethylene feedstock.
- Pipeline exports to Mexico from South Texas, the Permian Basin and the Southwest will increase to 8 Bcf/d by 2040.
- Utilization of existing natural gas pipeline infrastructure will continue to increase, but additional incremental, regional infrastructure will be needed to meet the demand growth over the next 20 years.
- By 2040, wind and solar resources will account for 20% of the 4,650 TWh of total electric generation in the United States, compared to 8% in 2017.
- Natural gas-fired generation remains a cost-effective baseload resource. Consequently, the need for additional gas-fired generation translates to an additional 11 Bcf/d of natural gas demand through 2040.

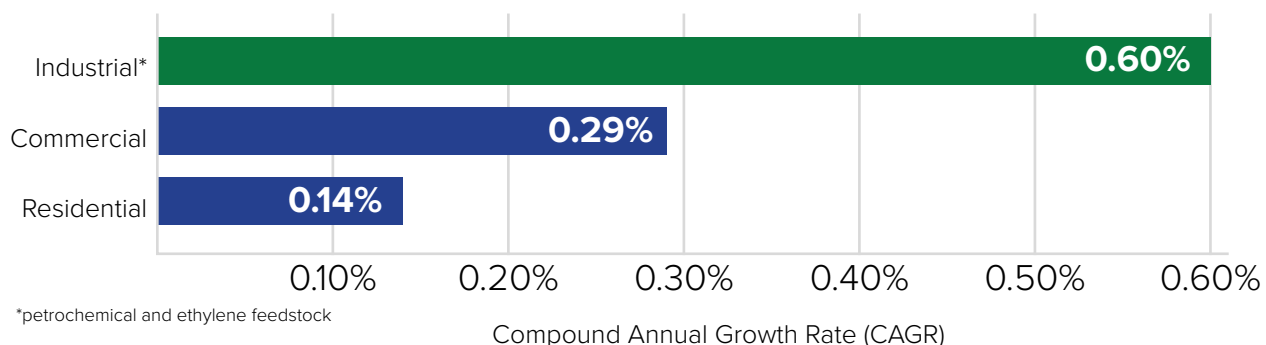
Balanced Future



Sustained/steady transition to a lower-carbon economy

- ✓ RPS goals met on schedule
- ✓ Sustained growth of battery storage additions to meet mandates
- ✓ Strong second wave of LNG and pipeline exports
- ✓ Economic-based investment decisions

Demand for Natural Gas Will Continue to Grow Across All Sectors (2020–2040)



THE RAPID RENEWABLES TRANSITION SCENARIO:

Increased adoption of renewables throughout the U.S. energy mix driven heavily by policy initiatives intended to accelerate this process.

- States with renewable portfolio standards (RPS) will build renewable generation resources so that at least 50% of their electric load is met with renewable generation by 2040.
- LNG exports and pipeline exports to Mexico will continue to utilize the existing gas pipeline transportation network at high load factors.
- Residential, commercial and industrial demand will remain close to 50% of the total U.S. consumption by 2040.

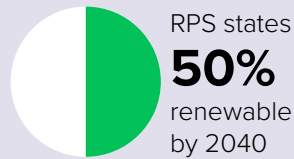
Rapid Renewables Transition



Global acceleration to carbon reduction

- ✓ Minimum 50% RPS targets
- ✓ Accelerated battery storage growth
- ✓ Operational and under-construction LNG terminals only
- ✓ Policy- or technology-driven investment decisions

Natural gas demand will remain close to current consumption levels. Existing natural gas infrastructure will continue to be utilized, and limited new infrastructure will be needed.



Natural gas will play a key role in supporting a lower-carbon economy by providing a safe, reliable, and low-cost source of energy

- ✓ Natural gas-fired generation will continue to play an important role in supporting renewable generation and maintaining electric system reliability under both scenarios analyzed in this report.
- ✓ The intermittent nature of solar and wind generation resources significantly increases the need for flexible, fast ramp-up generation supplied by natural gas to maintain the reliability of the electric grid in the United States.
- ✓ Variation and unpredictability in renewable generation creates challenges because of the misalignment between when renewable generation is available and when generation is needed to meet demand.

