NATURAL GAS & RENEWABLES

Potential questions related to the growth of renewable power generation and its impact on natural gas demand

1. What happens to natural gas demand growth as renewable energy becomes a larger portion of the electric generation mix?

Over the last 10 years, wind and solar generation have increased from 0.5 percent to 5.3 percent of the generation mix. In that same period, natural gas-fired generation increased from 18.8 percent to 32.8 percent of the generation mix, and overall natural gas consumption has increased from 60.2 billion cubic feet per day (Bcf/d) to 75.0 Bcf/d, an increase of 25 percent. The abundance of U.S.-produced natural gas has lowered prices, making it an attractive, clean, affordable energy source for power generation and many other uses, both domestically and in international markets to be met by U.S. liquefied natural gas (LNG) exports.

As many coal-fired power plants are retiring, and even as more renewables are added, natural gas will continue to be an increasingly important fuel source for power generation, providing both direct load service and the rapid backup that those intermittent sources of electric generation require. Moreover, with the potential increased adoption of electric vehicles and increasingly stringent clean air regulations, U.S. power demand could increase by more than 4 Bcf/d over the next two decades. And of course, the majority of natural gas is used for purposes other than electricity.

- **What other uses exist for natural gas besides power generation?**

Natural gas is critical for many uses aside from power generation, including in heating homes and commercial businesses, and in hot water heaters. It is also used as a feedstock for making fertilizers and plastics, gas-to-liquids, fuel additives, chemicals, glass, drying and dehumidification. In 2015, 35 percent of the gas consumed in the U.S. went to power plants, 28 percent to industrial uses, 17 percent to residential uses, 12 percent to commercial uses, and the remaining 8 percent was used to transport and process the gas from the wellhead to the burner tip.

2. How do natural gas infrastructure requirements (or type of service) differ with varying amounts of renewable choices in the generation mix?

Currently, traditional gas-fired generation resources burn power over a period of several hours or days in a relatively steady and predictable pattern, and typically contract for firm pipeline capacity based on a ratable take over the 24 hours (1/24 service). With more renewables comes greater daily variability, requiring spinning reserves (power plants running but not producing power) or fast-start gas-fired power plants over a shorter window of the day. The rapidly changing demand for gas to serve these types of power plants requires more flexible gas infrastructure options, such as gas storage and/or pipeline services that can require larger amounts of reserved capacity on the pipelines per unit of power generated.

3. **How does end-use demand for natural gas play into its role in meeting state and federal emission standards? For example, do homes need to move off of natural gas and electrify in order to meet these standards?**

Natural gas is a clean-burning fossil fuel with substantially lower emissions compared to coal or fuel oil. By using more natural gas to generate electricity, we are ultimately lowering emissions. CO_2 emissions from electricity generation in 2015 were at their lowest level since 1993, and 21 percent below their 2005 levels. Therefore, the increased use of natural gas in the electric generation mix is becoming an increasingly important tool for policy makers and regulators to meet state and federal compliance targets with more stringent regulations and emissions standards. Because of either market forces or stringent regulations or both, power generators are shifting away from nuclear and coal to natural gas.

4. **What additional role does natural gas storage serve as renewable energy continues to grow as a share of the electric generation mix?**

Natural gas storage is an important part of responding to rapid changes in natural gas demand due to renewable energy's inherent intermittency – intermittency that occurs on both a daily and seasonal basis. Storage provides a readily available supply of gas that can be dispatched into the pipeline system when it's needed. Natural gas infrastructure (such as gas pipelines with gas storage) has enabled natural gas-fired generators to respond to market needs within minutes to address sudden changes resulting from outages, such as when coal or nuclear plants are down due to trips, line breaks or unscheduled maintenance; or when renewable supply interruptions occur unexpectedly as clouds block the sun or the wind stops blowing.

While some tout battery storage as a way to backup intermittent renewable generation, there are still years of work and research to be done and significant technological advancements required before it is a viable and realistic option. Large-scale battery facilities using current battery technology are not able to provide the storage capacity and power output required at a reasonable cost. Therefore, natural gas infrastructure must help fill the void. Natural gas and renewables complement each other because natural gas is reliable, flexible and clean. It can be dispatched (turned on) very quickly, making it an efficient backup source to renewable power generation. Still, it is important to keep in mind that because renewable generation is intermittent, it is less economically valuable to electric customers who typically depend greatly on reliability.

5. **What impact does the EPA's Clean Power Plan have on natural gas demand growth in the power generation sector?**

The Clean Power Plan (CPP) is a proposed EPA regulation that aims to reduce greenhouse gas emissions from electric power plants. This regulation will undoubtedly result in less coal-fired generation. Natural gas will be needed to replace the generation capacity lost by the resulting coal retirements and closures of uneconomic nuclear plants.

The US Energy Information Agency (EIA) expects coal-fired generation to decline by between 24 percent and 28 percent from 2015 to 2030, depending on the adoption of the CPP. Even without the adoption of the CPP, the expected decline in coal-fired generation, along with an expected increase in absolute electricity demand, are likely to drive substantial growth in both natural gas and renewable generation capacity.