



AEO2023 Issues in Focus: Effects of Liquefied Natural Gas Exports on the U.S. Natural Gas Market

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Executive Summary

To explore the effects of future U.S. liquefied natural gas (LNG) export volumes on domestic natural gas prices, we examined a range of potential LNG price and investment drivers using the same model we used to develop our [Annual Energy Outlook 2023](#) (AEO2023). The amount of U.S. LNG export capacity that will ultimately be built remains uncertain, and how this incremental capacity would affect domestic prices, consumption, and supply is a topic of interest in energy markets.

We designed three additional cases (beyond those in our AEO2023) that looked at lower international natural gas prices (Low LNG Price), higher international natural gas prices (High LNG Price), and higher prices with faster development of export facilities than we allowed in our AEO2023 cases (Fast Builds Plus High LNG Price). Across these cases, we found that LNG export volumes affected the resulting annual average U.S. natural gas price (Table 1). The resulting variation in natural gas prices in these three cases, however, was narrower than recent in history and our AEO2023, despite a wide variety of U.S. LNG export volumes.

LNG exports from the United States have steadily grown since 2016, when the first liquefaction unit—or *train*—at [Sabine Pass in Louisiana](#) entered service. Following several years of LNG capacity additions, the United States became the [world’s largest LNG exporter](#) during the first half of 2022, when U.S. LNG exports averaged nearly 11.2 billion cubic feet per day (Bcf/d), about 12% of the dry natural gas¹ produced in the United States. In AEO2023, we project that total natural gas exports, by pipeline or as LNG, will become larger than any domestic end-use sector, including residential, commercial, industrial, and electric generation, by the early 2030s to become the largest component of U.S. natural gas demand in the AEO2023 Reference, High Oil Price, and High Oil and Gas Supply Cases.

Table 1. Summary of results in 2050, *Annual Energy Outlook 2023*

	Reference	Low LNG Price	High LNG Price	Fast Builds Plus High LNG Price	2018–22 Range	
					Low	High
Liquefied natural gas (LNG) exports (Bcf/d)	27.3	15.3	39.9	48.2	3.0	10.8
Henry Hub spot price (2022\$/MMBtu)	\$3.77	\$3.28	\$4.31	\$4.81	\$2.23	\$6.52
Natural gas consumption (Bcf/d)	82.2	82.5	81.9	81.7	82.7	87.7
Industrial natural gas consumption, excluding lease and plant fuel (Bcf/d)	27.3	27.4	26.9	26.7	22.2	23.3
Electric power natural gas consumption (Bcf/d)	21.2	22.8	19.7	18.6	29.0	32.3
Natural gas share of electricity generation	22%	23%	20%	19%	34%	40%
Electric power price (2022¢/kWh)	11.0¢	11.0¢	11.1¢	11.2¢	12.1¢	12.3¢

Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2023*

Note: Bcf/d=billion cubic feet per day, \$/MMBtu=dollars per million British thermal units, ¢/kWh=cents per kilowatthour

¹ Dry natural gas is natural gas that remains after the liquefiable hydrocarbon portion has been removed from the natural gas stream (that is, natural gas after lease, field, or plant separation) and any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable. Dry natural gas is also known as consumer-grade natural gas.

LNG export facilities in the United States have a combined operating capacity under real world operating conditions of 11.4 Bcf/d with an additional 7.3 Bcf/d of capacity under construction. A further 18.3 Bcf/d of possible LNG export capacity has [received full regulatory approval](#) from the U.S. Department of Energy (DOE) and the Federal Energy Regulatory Commission (FERC) but has not yet received a final investment decision, an important step before construction can begin.

Within the model, the key determinants of LNG export volumes are international LNG prices and the rate at which new LNG export terminals can be constructed. Model results showed that higher LNG exports results in upward pressure on U.S. natural gas prices and that lower U.S. LNG exports results in downward pressure. Our projected price of U.S. natural gas at the Henry Hub in 2050 varied from \$3.30 per million British thermal units (MMBtu) to \$4.80/MMBtu, depending on the volume of U.S. exports in the cases we explored. In the AEO2023 Reference case, we projected a price of nearly \$3.80/MMBtu, and we projected prices as high as nearly \$6.40/MMBtu in the Low Oil and Gas Supply Case and as low as nearly \$2.80/MMBtu in the High Oil and Gas Supply case.

Future dry natural gas production ranged from 104.1 Bcf/d in the Low LNG Price case to 134.6 Bcf/d in the Fast Builds Plus High LNG Price case, based on varying amounts of U.S. LNG exports. Natural gas production on the Gulf Coast and in the Southwest was the most affected by LNG export volumes because these producing regions are located near LNG export terminals.

We saw lesser effects on domestic natural gas consumption. Natural gas consumption in the electric power sector was the most sensitive to the varying U.S. LNG export volumes, ranging from a 7% increase in the Low LNG Price case to a 12% decrease in the Fast Builds Plus High LNG Price case compared with the Reference case in 2050. Natural gas consumption in the manufacturing sector responded slightly to natural gas price signals, ranging from a low of 26.7 Bcf/d in the Fast Builds Plus High LNG Price case to a high of 27.4 Bcf/d in the Low LNG Price case. In total, U.S. natural gas consumption changed only slightly across the cases because decreases in domestic consumption are largely offset by additional natural gas consumption required to support higher levels of LNG production and transmission. Total consumption varied from a 0.4% increase in the Low LNG Price case to a 0.8% decrease in the Fast Builds Plus High LNG Price case relative to the Reference case.