



March 2024

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U.S. Residential Gas Consumers Bear Brunt of LNG Exports

- *Increased exports of liquefied natural gas (LNG) have raised prices for U.S. residential customers.*
- *The exports have exposed U.S. customers to the increased volatility of the global natural gas market.*
- *The U.S. Department of Energy has failed to consider the inflationary impact of LNG exports on the domestic market.*
- *Prices for residential consumers have already risen beyond projections made by the department.*

Introduction

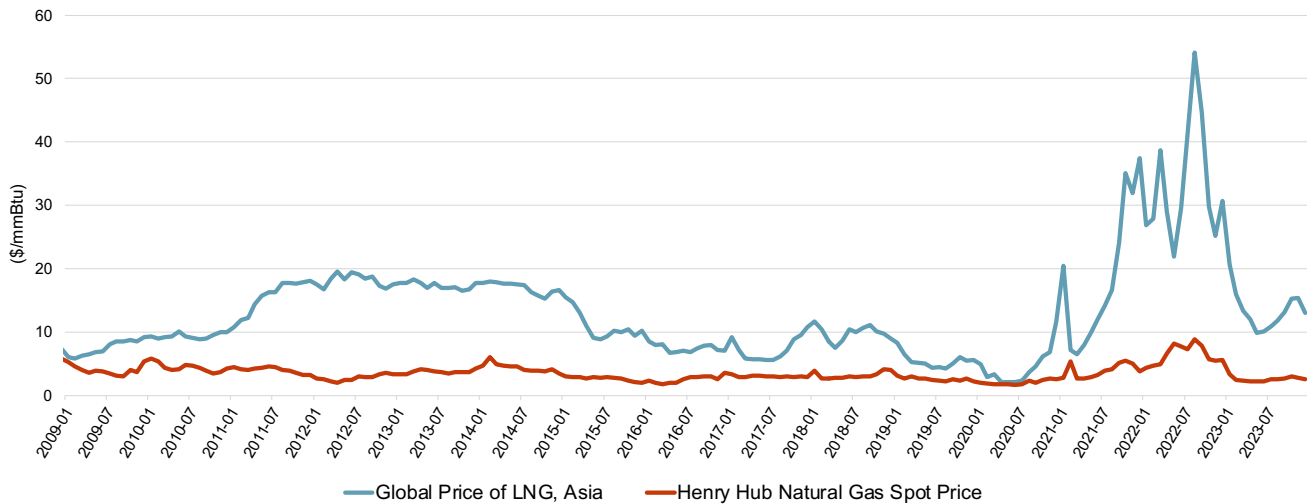
In 2016, the United States began shipping liquefied natural gas (LNG) exports via LNG carriers, allowing domestic producers to profit from low-priced natural gas. By 2023, amidst increasingly chaotic market conditions, residential prices increased by 9% for U.S. consumers. The continued failure by the U.S. Department of Energy's (DOE) impact analysis to consider the inflationary impact of LNG exports on U.S. consumers and producers is a major weakness in its economic assessments.

It's time for a reality check. Previous DOE studies have argued that LNG exports have little influence on domestic natural gas prices. But real-world evidence, bolstered by economic theory, reveals that LNG exports have already linked U.S. natural gas prices to the volatility of the global market. And as the United States exports more LNG, this problem could get worse.

The Asian region has been a dominant LNG export destination, receiving about one-third of all U.S. LNG exports since the buildout of U.S. LNG terminals. As the chart below shows, the U.S. natural gas price benchmark—the Henry Hub price—has been both lower and more stable than Asian prices (the competitive alternative) over the past 15 years (Figure 1). The spread between the two markets is also an example where LNG exporters can capture profits by selling low-priced U.S. gas in high-priced overseas markets.



Figure 1: Comparison of U.S. Natural Gas and Asian LNG Prices



Source: Federal Reserve Bank of St. Louis.

But arbitrage has consequences. Exports tend to lift prices in low-priced markets, making regional commodity markets—such as the North American gas market—susceptible to the volatility of global markets. This is exactly what happened in 2021 and 2022, when surging European demand for U.S. LNG lifted U.S. gas prices to their highest levels in more than a decade. It’s also what happened when the U.S. started exporting crude oil in 2015: U.S. oil prices more closely mirrored the movements of international [oil markets](#).

In remarks to the Senate Committee for Energy and Natural Resources on Feb. 8, DOE Deputy Secretary David Turk argued that the agency needed to pause new LNG export permits so that it could evaluate the impacts of LNG exports on [U.S. gas market volatility](#):

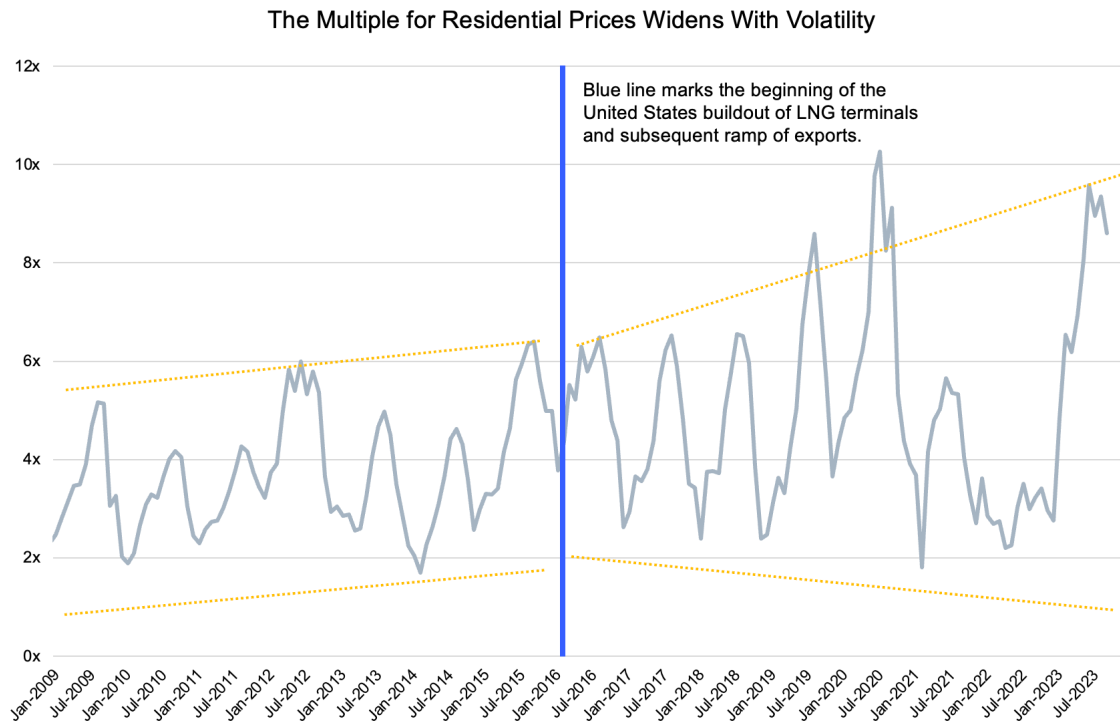
“Natural gas prices have been relatively stable in the U.S. compared to European and Asian markets, where benchmark prices for natural gas have been about 50-100% more volatile. Rigorous analysis needs to consider how expanding U.S. natural gas export capacity to the level already permitted today and perhaps beyond could inject domestic natural gas markets with this kind of exposure to volatility and increasing prices, and how that could impact American households and manufacturers.”

Turk’s statement suggests that his agency’s prior analyses was not as rigorous as needed. That would echo [IEEFA’s characterization](#) of the studies that the department has used to conclude that LNG exports are in the public interest.

Turk’s concerns over volatility are warranted, given the growth in volatility seen since the first U.S. LNG export via seaborne carrier set sail in early 2016. A review of residential gas prices illustrates the problem. (See Figure 2.)



Figure 2: U.S. Residential Natural Gas Prices as a Multiple of Wholesale Prices



Source: IEEFA, based on U.S. Energy Information Administration data.

In the seven years before the U.S. buildout of LNG export terminals, homeowners and renters paid an average of 3.9 times the wholesale price of natural gas. Since shipments began in 2016, residential natural gas consumers have paid an average of 5.2 times the wholesale price. The yellow channels (for high and low boundaries of the residential-to-wholesale factor) widened as exports grew. This is a clear indication that greater volatility is accompanied by higher prices for consumers.

This pattern evolved while average wholesale natural gas prices fell from \$3.69 per million metric British thermal units (MMBtu) over the first seven years (prior to LNG exports) to \$3.37/MMBtu in the later seven years. In contrast to flat wholesale natural gas price changes over time, the average prices for residential natural gas grew by 9 percent between the two seven-year periods. Specifically, the difference between the two average price periods for residential natural gas was an increase from \$13.03/MMBtu (pre-exports) to \$14.24/MMBtu (post-exports).

Residential price data is based on sales. Residential volumes of natural gas are reported by the DOE’s Energy Information Administration (EIA) based on sales and deliveries. Residential prices also include tax, delivery, demand, and commodity prices. As such, the change in average prices is likely due to more than just changes in underlying commodity prices over time.

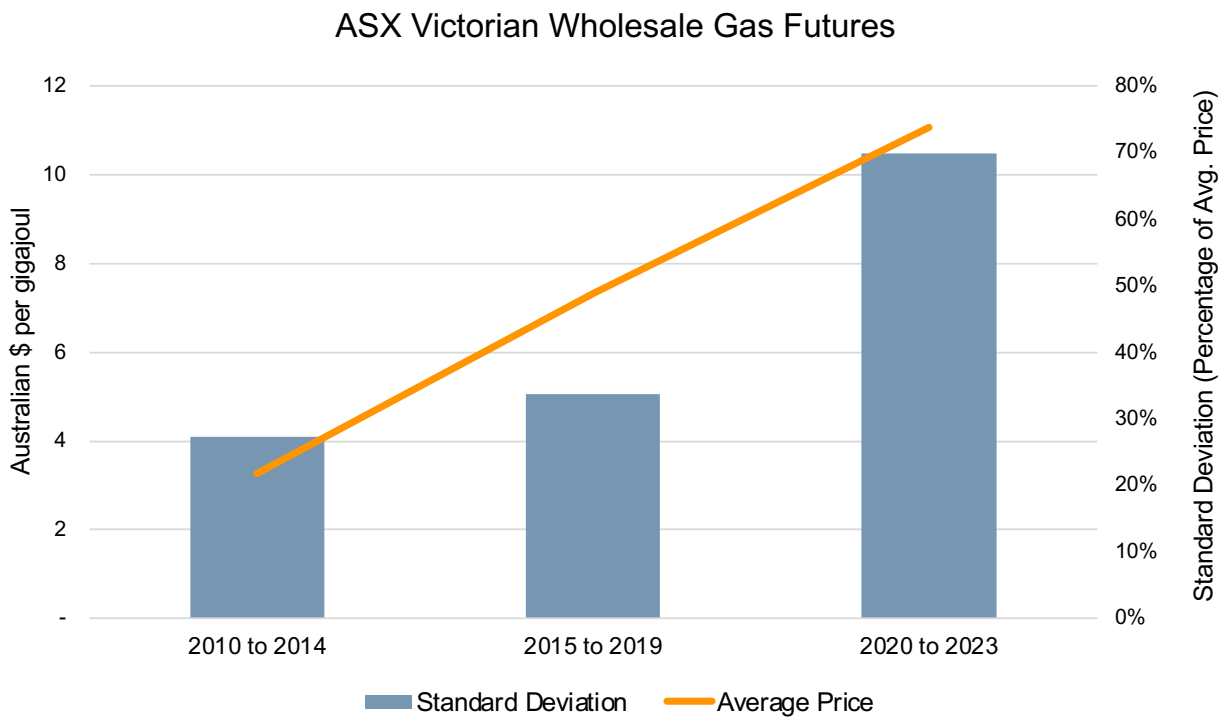


Australia Serves as a Proxy

The intensity of the linkage between global and domestic prices will strengthen as exports grow, causing even greater local price fluctuations that react to global conditions. A review of Australia’s price action serves as a warning of what could be awaiting U.S. consumers. Australia recently experienced a domestic shortage of natural gas, even though it is one of the world’s top three exporters of LNG.

A [policy brief](#) by Rice University’s Baker Institute for Public Policy discussed the linkage that the export price for LNG cargoes had on Australia’s domestic natural gas prices. Australia saw prices double in the five years after three LNG terminals started operations between 2015 and 2016. The surge in prices ensued because of the buildout and was further exacerbated by domestic shortfalls (see Figure 3). The growing linkage to global LNG prices caused domestic average prices to grow from about AU\$5 to more than AU\$10 per gigajoule, while standard deviation for the commodity also doubled, all occurring after these three terminals commenced operation.

Figure 3: Stepped Up Price and Volatility in Australia



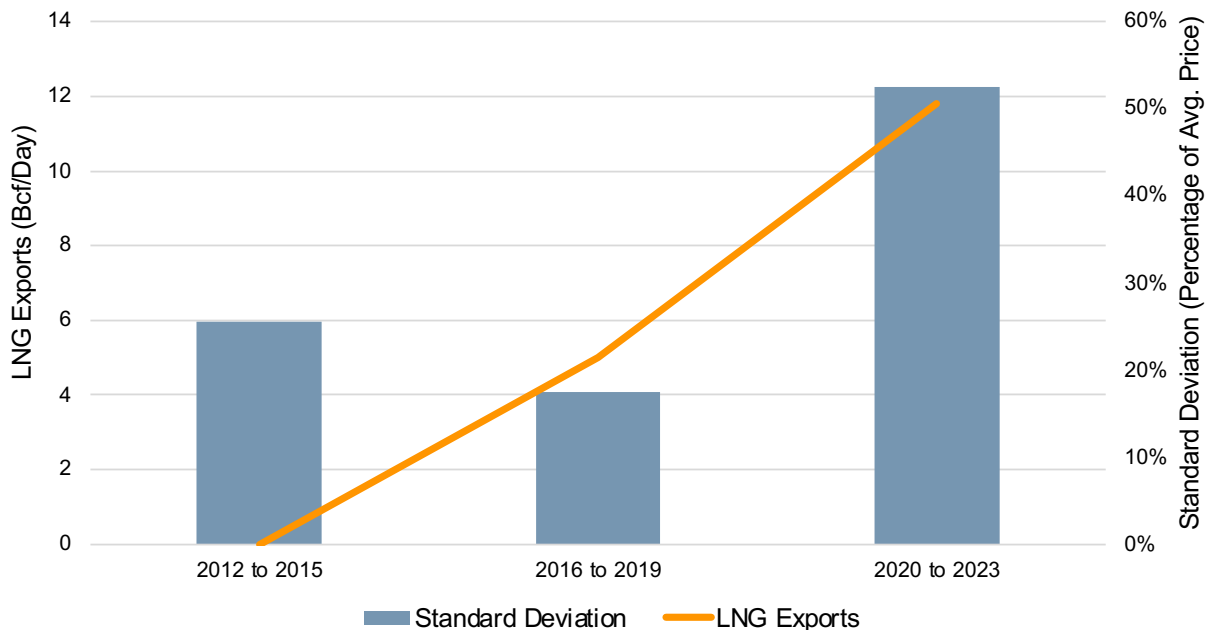
Source: Australian Energy Market Operator.



Increased Volatility Already a Reality in United States

When measured as the percentage of average prices that one standard deviation of price movements claims, the picture is clear: Natural gas price volatility and U.S. LNG export levels are growing in tandem (Figure 4).

Figure 4: U.S. Price Volatility Levels Are Tied to LNG Exports



Source: Federal Reserve Bank of St. Louis, EIA, International Monetary Fund.

Overlaying these two elements (the ramp of LNG exports compared to four-year measurements of the standard deviation of natural gas prices) illustrates that as LNG exports doubled, the associated volatility for Henry Hub prices tripled between 2019 and 2023. The catalyst for these changes is the greater exposure of U.S. local natural gas markets to global prices, forming a stronger bond via the ramping up of LNG exports.

Dissecting EIA Studies

Volatility translated into a knock-on effect for residential prices—an impact IEEFA believes was not captured in most of the [DOE-commissioned studies](#).

Although all studies agreed that increased LNG exports yielded higher natural gas prices for U.S. producers, only the EIA’s [Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets \(January 2012\)](#) and [Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets \(October 2014\)](#) studies explicitly quantified the projected effects of exports on natural gas prices for residential consumers.

Compared to a baseline reference price (using combinations of three export scenarios and five supply scenarios for a total of 15 scenarios examined), the EIA anticipated residential prices would rise as much as 8.5% between 2015 to 2040, due to rising LNG exports.



However, U.S. residential gas prices already are up an average 9% (i.e., average price from 2016 through 2023) compared to the average residential base price (i.e., average price from 2009 through 2015), surpassing EIA projections in just the first seven years of the entire 25-year projection. Given that actual results are more dramatic than the highest expectation from EIA's analysis, IEEFA's concern that the current econometric models used by DOE fail to adequately represent natural gas and LNG market behaviors appears justified.

Conclusion

The EIA will not publish its Annual Energy Outlook (AEO) in 2024 because of the need to revamp its National Energy Modeling System (NEMS) to better consider hydrogen, carbon capture, and emerging technologies. Core to EIA's mission, the NEMS serves as the tool used to generate long-term projections that then provide guidance to policymakers.

Since we have shown the NEMS model to inadequately capture natural gas price dynamics that are associated with increasing LNG exports and their impact on U.S. consumers, correcting unrealistic price projections used to set policy should be considered during the enhancements process for the NEMS model.



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Trey Cowan is a finance professional with 30 years of experience focused primarily on providing commentary & analysis to capital markets and upstream oil & gas management teams. Prior to his current position, Mr. Cowan was an analyst with S&P Global (Platts Analytics) where he focused on U.S. upstream drilling activities and fundamental energy trends. Mr. Cowan is a Texas licensed CPA and holds an MBA in Finance from Vanderbilt University.

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