Winter 2022-2023 Natural Gas Market Outlook

Executive Summary

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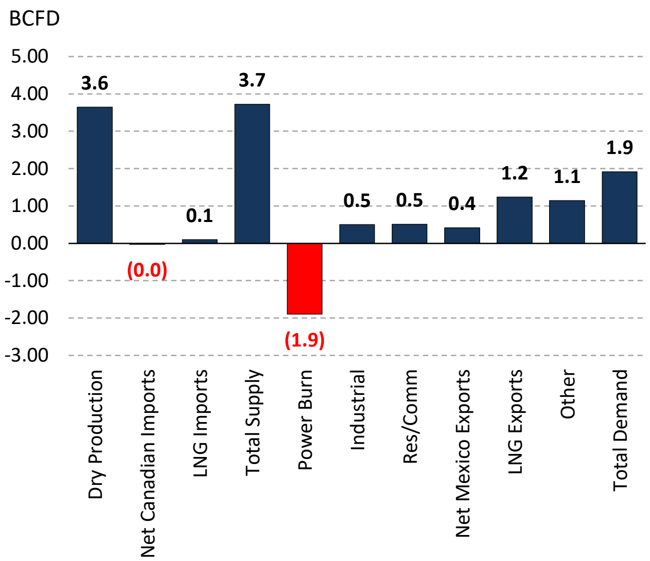
Despite production growth, demand gains will keep L48 storage below 5-year average

Summer Natural Gas Supply and Demand Summary	2022-2023 Winter	2021-2022 Winter	2020-2021 Winter	2019-2020 Winter	Difference vs Last Winter	Difference vs Last Three Winters
Supply (BCFD)						
Dry Production	98.2	94.5	90.1	95.1	3.6	4.9
Net Canadian Imports	5.6	5.6	5.5	4.6	(0.0)	0.3
LNG Imports	0.2	0.1	0.1	0.2	0.1	0.0
Total Supply	103.9	100.2	95.8	99.8	3.7	5.3
Demand (BCFD)						
Power Burn	27.0	28.7	26.8	29.0	(1.7)	(1.2)
Industrial	25.3	24.8	23.9	24.5	0.5	0.9
Res/Comm	37.7	37.2	37.3	36.4	0.5	0.7
Net Mexico Exports	5.9	5.5	5.4	5.2	0.4	0.5
LNG Exports	13.4	12.2	10.3	8.5	1.2	3.1
Other	8.8	7.6	7.2	7.6	1.2	1.3
Total Demand	118.1	116.0	111.0	111.2	2.1	5.4
Average Withdrawal (BCFD)	14.2	15.8	15.2	11.3	(1.6)	0.1
Total Withdrawal (BCF)	2,133	2,254	2,119	1,720	(121.6)	101.6
HDDs	3,437	3,327	3,398	3,294	110.0	97.3

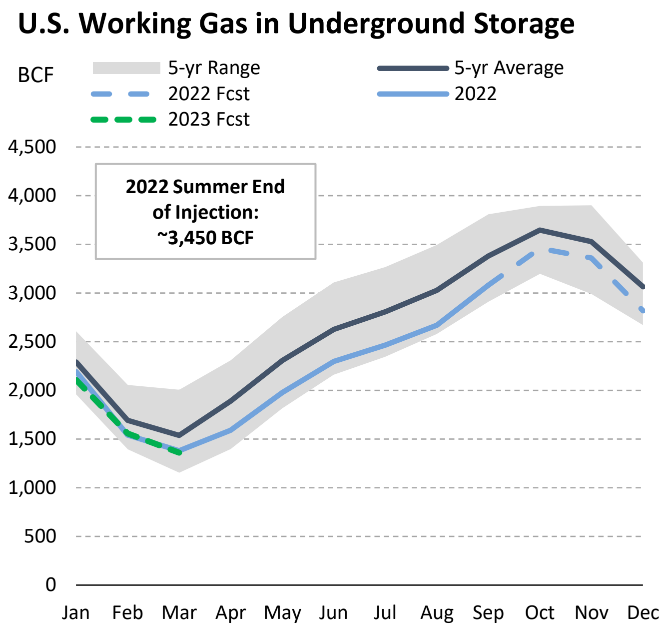
Natural Gas Supply and Demand, 2022/23 Winter vs 2021/22 Winter



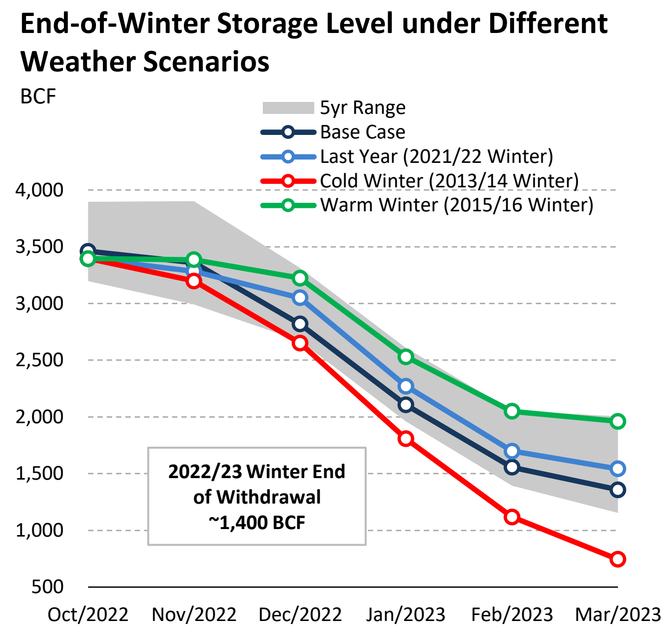
Source: Energy Ventures Analysis

- Compared to last winter, U.S. natural gas dry gas production is expected to grow by a resounding 3.6 BCFD, driven by Haynesville and higher associated gas output. Canada imports remain nearly flat, but the widened US-Canada basis differentials could lead to higher Canadian supply.
- On the demand side of the ledger, the estimated weather-normalized power burn outlook for Winter 22/23 is lower by 1.9BCFD YoY, while the decline will be largely offset by higher industrial demand and LNG exports. LNG feedgas demand is expected to grow by a total of 1.2 BCFD and Mexico pipeline flows are expected to grow by 0.4 BCFD.

U.S. natural gas markets will remain tight this winter



Source: EIA, Energy Ventures Analysis

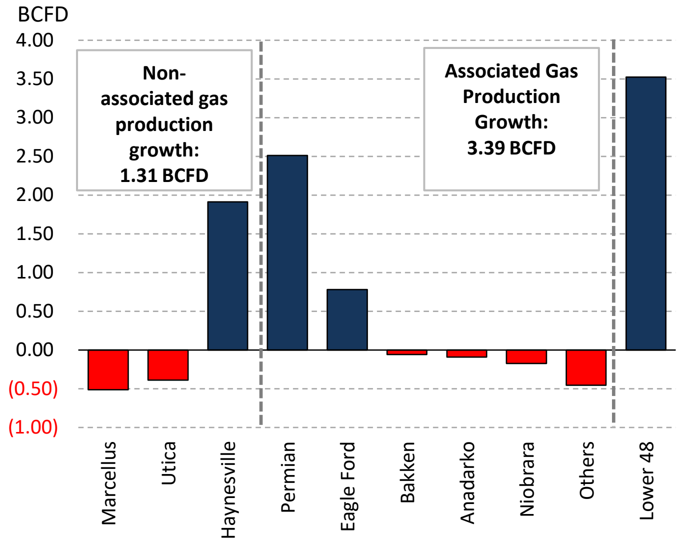


Source: Energy Ventures Analysis

- Looking back to last winter, the U.S. natural gas markets finished the 2021-22 winter with a tighter balance. Although reliability was not impacted, freeze-offs during extreme cold events briefly limited natural gas production and simultaneously added heating demand. Ongoing coal supply shortages, the commissioning of an additional 1.6 BCFD of LNG exporting capacity, and higher industrial demand limited storage injection gains.
- Geopolitical tensions in Europe resulted in fuel reliability concerns for coal, oil, and gas supply for international energy markets, driving increased price volatility.
- Henry Hub prices surged to $10/MMBTU in August 2022, reflecting the strong global and domestic demand outlook and the inflationary shock from energy prices, although U.S. natural gas prices remain exponentially lower than natural gas prices in Europe and Asia.
- Looking forward, U.S. natural gas markets will remain tight this winter assuming normal conditions. Low coal stockpiles and skyrocketing coal prices have countered much higher natural gas prices ultimately limiting traditional switching between coal and natural gas. Despite higher gas prices, high electric demand has supported gas-fired generation this summer. However, given regional gas forward market prices, coal-fired and oil-fired generation will play a critical role for this coming winter heating season. Solid LNG demand overseas will also keep U.S. LNG terminals operating at or above the nameplate capacity. Beyond that, U.S. LNG exporting capacity will remain steady at 13.5 BCFD until 2024.
- Although the extensive gain in oil and gas prices should incentivize more drilling, limited takeaway capacity, increased price volatility, military conflict in Europe, and uncertainty around the permitting process and how ESG concerns will be factored into future investments are fueling uncertainty around the long-term supply potential. EVA expects a moderate near-term production growth as North American producers stick to financial disciplines to avoid over-investment.

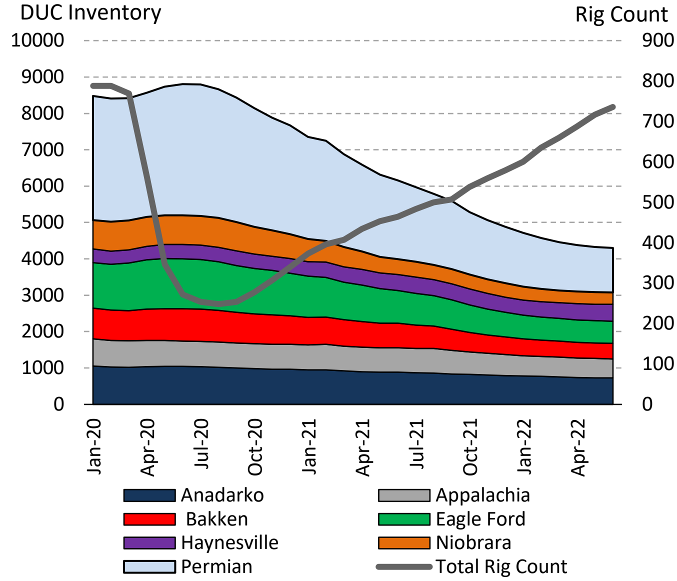
Major producers ramp up production: approaching pre-pandemic levels

Year-over-year Production Change by Basin (Summer 2022 vs. 2021)



Source: EIA, Energy Ventures Analysis

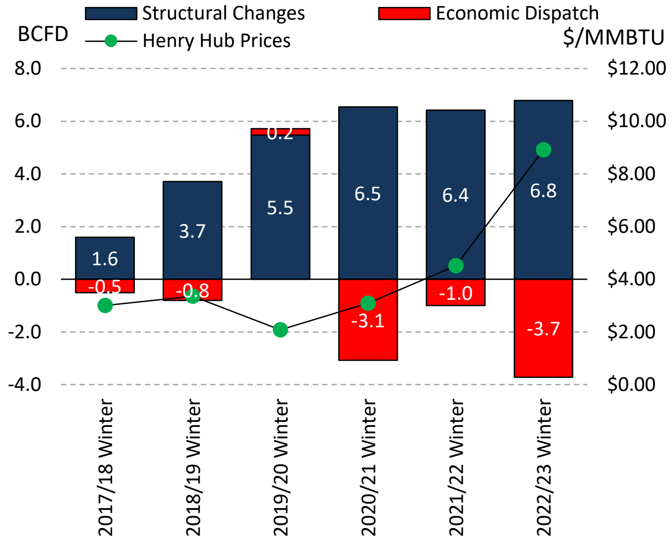
Drilled but Uncompleted Wells Inventory in Major U.S. Producing Areas



- Last winter's gas production averaged 4.7 BCFD higher than the previous winter, with Permian and Haynesville leading the growth, underscoring strength in both associated and non-associated gas production. U.S. dry gas production rose to 96 BCFD in Dec-2021, the highest level observed since the pandemic Natural gas production will likely resume the upward trend seen before the cold weather of January through March, although the magnitude of growth remains uncertain.
- The price rally will likely incentivize more drilling activity in the short term, especially with the steady decline of the drilled-but-uncompleted wells (DUC) inventory. The number of DUC wells has been falling at a 4% monthly rate since April 2021, but has slowed recently. To maintain or expand the current output, new drillings are necessary. This decline in the DUC inventory is yet another indicator of increased natural gas production activity.
- U.S. gas-weighted producers are forecast to increase CAPEX by 30% in 2022 while oil-focused producers are expected to raise spending by 17%. However, with the inflationary shock and an ongoing decline in the DUC units, the published budget may only be able to support a moderate growth from the current production level. EVA expects U.S. dry gas output to average 98.2 BCFD in Winter 2022/2023, ~4% higher YoY.
- The DUC inventory remains below the pre-pandemic level as the upstream sector suffered from equipment/labor shortages and inflated costs.   However, rig counts are much higher than 2020 levels.
- The development of takeaway capacity also plays a role in E&P investment. The certification of new gas projects, including pipelines and LNG terminals, will be subject to greater scrutiny if FERC finalizes its certificate and GHG policy statements in their current problematic forms that require the consideration of difficult-to-quantify indirect and cumulative GHG emissions.
- The 2-BCFD Mountain Valley Pipeline (MVP), already 94% completed, faced increased regulatory challenges after the federal court revoked a key permit in January. Because of the further delay, Northeast customers will not benefit from the cost reduction associated with MVP this winter. The mid-term Northeast gas production outlook will largely hinge on the development of this project.
- Robust production growth in Permian will also test the takeaway capacity limit in the next two years. Major pipelines Agua Blanca (1.8 BCFD), Gulf Coast Express (2 BCFD), and Whistler (2 BCFD) completed over the past three years were over 90% utilized in 2021. However, around 6 BCFD of regional takeaway pipeline projects are still on hold while the market sorts them out.

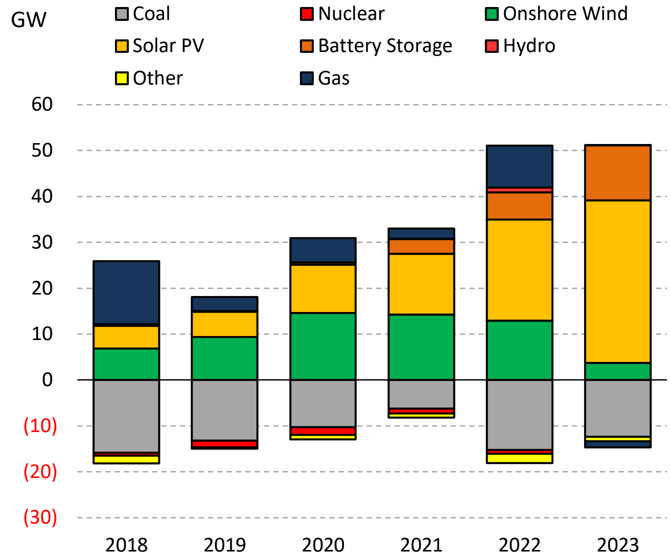
Banner year for new natural gas and renewable capacity will be offset by less short-term switching to natural gas

Power Burn Increase from 2014/15 Winter: Structural Growth vs. Economic Switching



Source: Energy Ventures Analysis
Note: 2022/23 winter prices are NYMEX settlements as of 8/17

Net Change in U.S. Generating Capacity



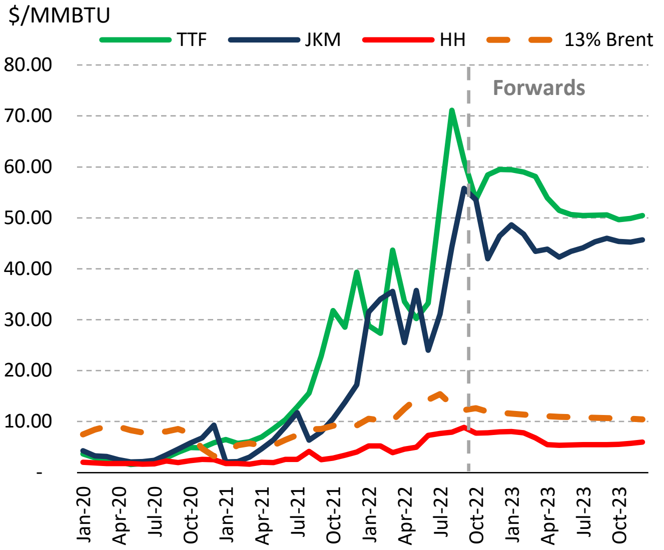
Source: Energy Ventures Analysis, U.S. EIA

- Summer 2022 set the stage for the coming winter. Looking back at Summer 2022, despite much higher Henry Hub prices, dispatch cost competition between gas-fired and coal-fired generation was tighter than expected due to rising coal costs.
- Higher prices for replacement coal due to spikes in international coal markets will keep the competition between coal and gas tight for the winter, especially in the eastern part of the country. Coal stockpile levels have not recovered despite the strong utilization of gas-fired generation displacing coal-fired generation. Given the current state of the U.S. coal market, coal plant dispatch is likely to be limited throughout 2023. Coal prices for Eastern markets are nearly 5x higher YoY.
- Comparing this winter to a baseline of 2015, a gain of 6.8 BCFD of long-term structural demand growth from new combined-cycle gas units (CCGT) will be offset by a short-term decline of 3.7 BCFD.

- According to EVA's coal gas price sensitivity analysis, power burns in the South Central and East regions are most sensitive to price changes.
- In 2022, nearly 17 GW of coal capacity will be retired while 10 GW of gas-fired units will be added - the biggest annual capacity shift for each resource category since 2019.
- 2022 will also be a milestone year for renewable installations. Nearly 45 GW of new wind, solar, and battery storage resources scheduled to be integrated into the generation mix. However, supply chain constraints owing to the pandemic delays, the Russia-Ukraine conflict, and the expected U.S. ban on Chinese panels allegedly produced using forced labor have increased uncertainties to the project timelines.
- Drought concerns in the West poses a threat to hydropower generation. With the delays in renewable installation, rapid retirement in coal capacity, and restricted hydropower availability, gas-fired generators will remain the primary swing resource to ensure grid reliability.
- Going forward, it will be essential to ensure that gas-fired generators have sufficient infrastructure to provide the flexibility needed to accommodate the higher ramping requirements of the growing number of variable resources coming online.

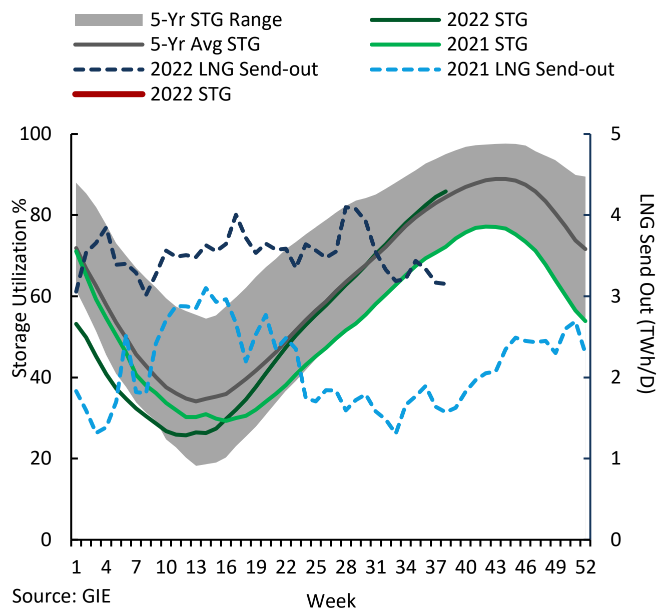
Sanctions on Russia's invasion of Ukraine threaten energy reliability in Europe and highlight the importance of U.S. natural gas

Global LNG price



Source: ICE. Future curves are based on 8/17/2022 settlements

EU Gas Storage Utilization & LNG Send-out

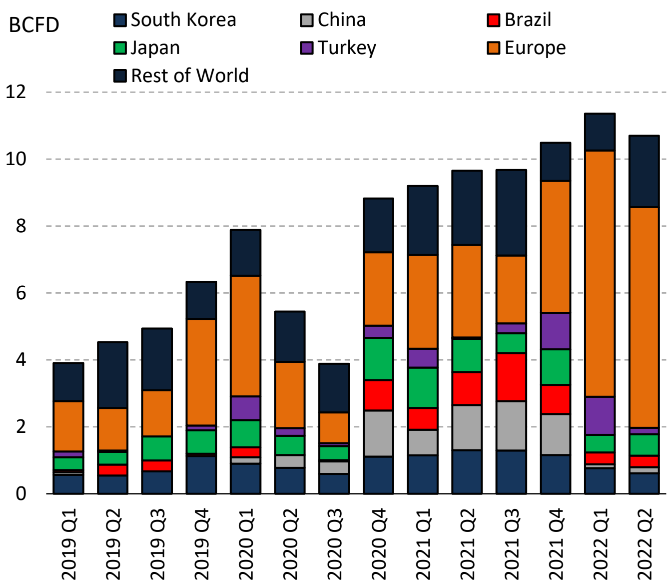


Source: GIE

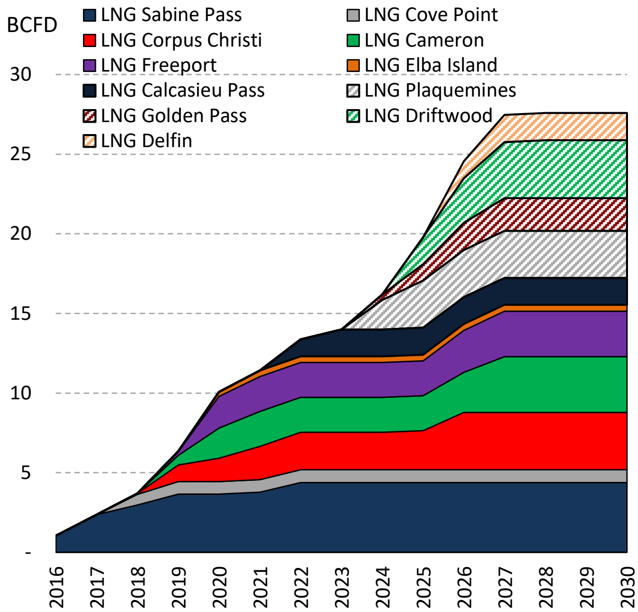
- The uncertainty over Russian gas supply to Europe surged after Russia invaded Ukraine. The potential disruption of Russian pipeline gas threatens the economy of Europe as it supplies 40% of EU's natural gas imports.
- The risk premium is likely to keep prices at TTF (European benchmark) trading above the JKM (Asian benchmark) index until Europe secures alternative sources. The suspension of Nord Stream 2, originally projected to double Russian gas deliveries to Germany, created a substantial market share for spot LNG cargoes.
- European storage remained below the seasonal normal as of April, but the deficit against the 5-yr average has narrowed with increased LNG supply and energy conservation. The European Commission has announced a target to refill the EU gas storage to 80% of capacity by November 1 while reducing the purchase of Russian gas by two-thirds before the end of the year. (Russian gas flows via Nord Stream 1 have been at zero since it began maintenance on 8/31/22) However, the path to meeting those goals can be rocky.
- The intensified competition for LNG cargoes limited the availability of spot cargoes as buyers have been trying to maximize purchases through long-term LNG contracts, which are less expensive than the current spot LNG prices. The market share of spot cargo fell to just 25% of total LNG trade this spring from as high as 40% in 2020. Downstream pipeline bottlenecks in NW Europe are further complicating Europe's energy woes and limiting the LNG send-out from regasification plants, even though the importing terminals are not fully utilized.

More U.S. LNG to flow into Europe while the total exports remain limited by U.S. LNG exporting capacity

U.S. LNG Export by Destination



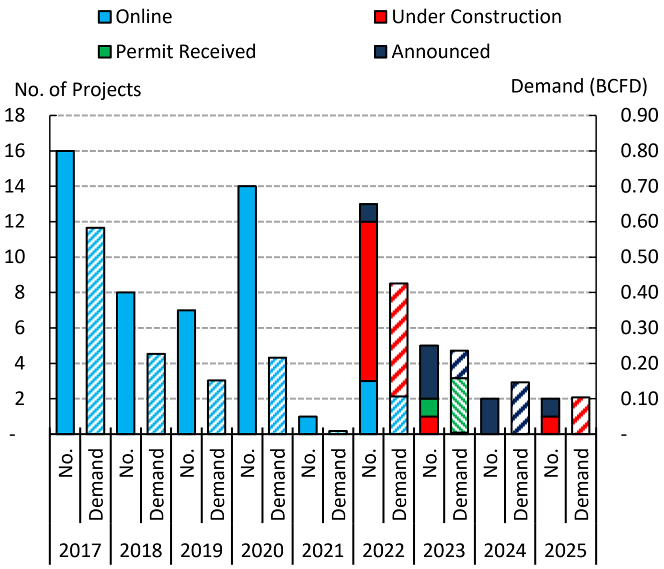
U.S. LNG Capacity Development through 2030



- U.S. LNG has become an increasingly important strategic energy source in Europe. The percentages of U.S. LNG cargoes flowing to Europe expanded from 18% in Q3 2021 to over 50% in Q1 2022, as European gas prices gained strength on Russian supply risk, trading at a premium above the Asian LNG benchmark JKM.
- President Biden's pledge to supply 15 billion cubic meters (BCM) more LNG (1.6 BCFD) to the EU in 2022 will not have a significant impact on U.S. LNG feedgas demand as all seven U.S. exporting plants were already operating at capacity. Instead, the announcement could redirect more U.S. cargoes from other markets to Europe, which was already in motion given European price signals over the past two quarters.
- As of March 2022, seven projects totaling 12.8 BCFD of exporting capacity are operating or are currently undergoing commissioning.
- Based on the current forward market settlements, estimated netbacks of U.S. LNG exports to NW Europe and NE Asia remained above $30/MMBTU through 2023. In the near term, U.S. LNG feedgas demand will be constrained at the nameplate capacity. The next major expansion is expected during the 2024/2025 timeframe.
- EVA expects U.S. LNG feedgas demand to average 13.4 BCFD this winter, if the Freeport LNG terminal returns to service in mid-November as currently expected.

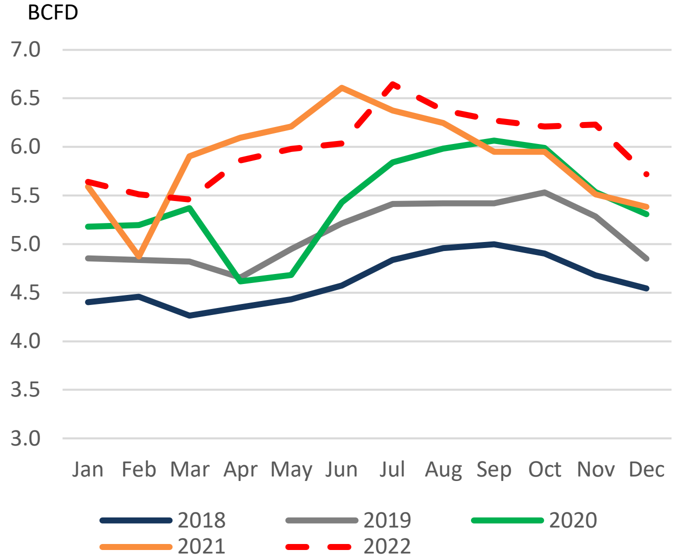
Structural growth expands natural gas demand from industrial customers and Mexico exports

Industrial Projects and Gas Demand



Source: Energy Ventures Analysis

U.S. Exports to Mexico



Source: Energy Ventures Analysis

- Industrial natural gas demand has remained strong since 2022 due to increased weather-related impact and improved industrial utilization. Jan-Aug 2022 industrial capacity utilization has averaged 79.8%, which is nearly 3% higher than the Jan-Aug 2021 average. Despite the increased risk of demand destruction due to high natural gas prices, the growth of industrial activity will likely continue as manufacturers try to ease the bottlenecks in the supply chain. The lower cost of U.S. natural gas relative to international prices gives U.S. customers a competitive advantage.
- The development of new industrial projects has supported the structural growth of weather-adjusted industrial demand. Despite delays associated with the pandemic, 46 projects came online during 2017-2021, solidifying 1.2 BCFD of natural gas demand. An additional 22 projects are expected to come online between 2022 and 2025, which could potentially add 1.0 BCFD of incremental gas demand.

- Mexico's demand for U.S. natural gas has increased by 40% over the past five years. As nearly half of Mexico's power generation came from natural gas in 2020-2021, the U.S. has become an increasingly critical supplier to Mexico's energy sector.
- U.S. natural gas exports to Mexico averaged 5.9 BCFD in 2021, 0.5 BCFD higher year-over-year, with expanded cross-border takeaway capacity that improved utilization of the downstream pipelines.
- TC Energy aims to start the Villa de Reyes pipeline by the end of 2022, allowing U.S. natural gas to reach central Mexico power plants and industrial facilities. The service of this project will further improve the utilization rate on the Sur de Texas-Tuxpan pipeline that draws gas from the Permian basin to Mexico.