

Economic Analysis

U.S. Natural Gas and COVID-19: a patient with mild symptoms

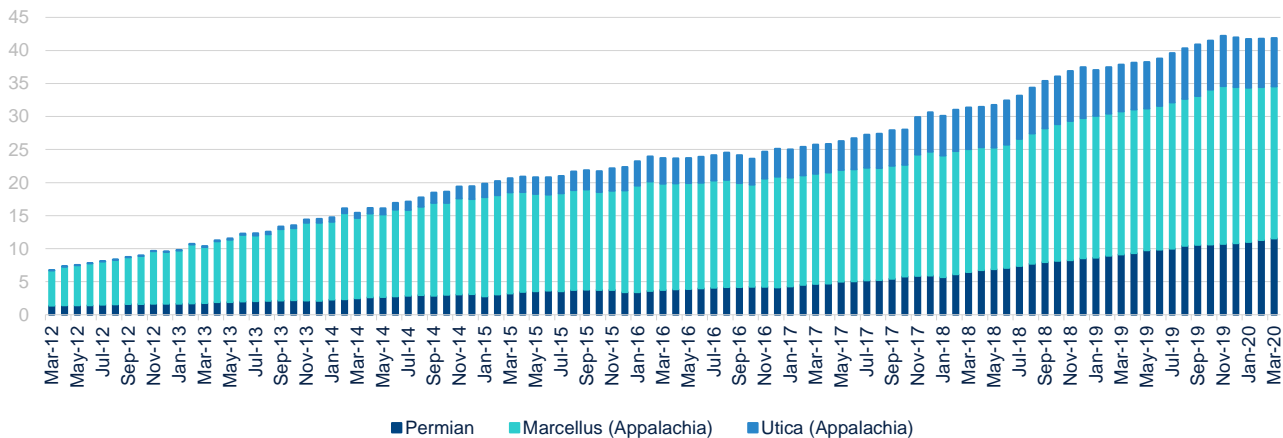
Kan Chen / Marcial Nava
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The natural gas industry will not be immune to the devastating impact that COVID-19 has had on the economy. Demand in the industrial and services sectors will significantly go down due to the extended "stay-at-home" policies across the states.

However, even before the pandemic, the industry was negatively affected by warmer-than-average winters and excessive production, despite increasing efforts to substitute coal with natural gas for the generation of electricity. Since November 2019, the market showed signs of oversupply, as the Henry Hub benchmark continued to slide down. In February 2020, prices went down to less than \$2 per million of British thermal units (MMbtu), well below what is considered an average break-even price of \$2.5/MMbtu.

Consequently, write downs and capex reductions were announced early in the year, particularly for companies operating in the Appalachian region. Production in Marcellus and Utica, two vital Appalachian shale plays entered a plateau. This stall suggests that current natural gas prices no longer support increasing drilling activity. Thus, further declines in Appalachia production seem unavoidable.

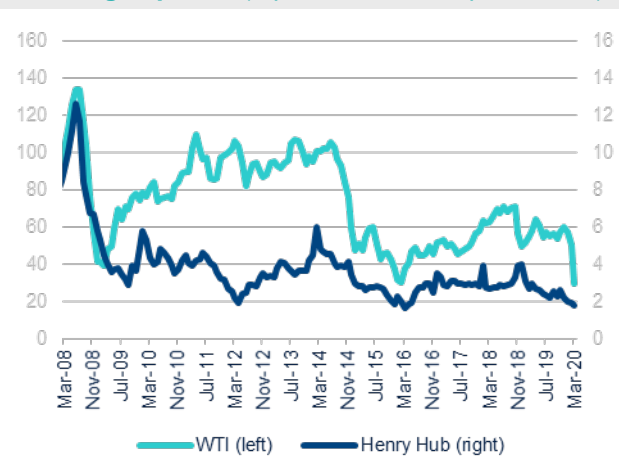
Figure 1. Natural gas production by region (Bcf/d)



Source: BBVA Research and Haver Analytics

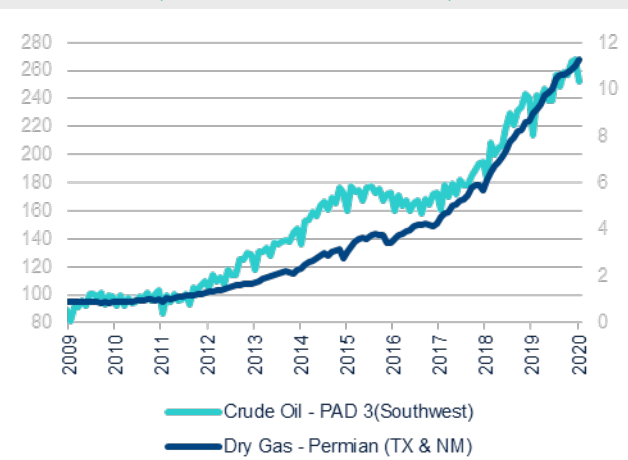
COVID-19 will likely exacerbate an expected decline in production. However, its effects won't be as catastrophic as they have been for the crude oil market. This is because the natural gas market has distinct characteristics in both production and consumption, which result in different price dynamics. In fact, since 2009, volatility in natural gas prices has been significantly lower than crude oil prices (see [Natural gas prices after the shale boom](#), BBVA Research, 2018). Since natural gas is mostly produced and consumed domestically, we do not expect the sometimes rampant effects from geopolitics, information asymmetry, and price competition observed in the crude oil market.

Figure 2. **WTI crude oil prices vs. Henry Hub natural gas prices** (\$ per barrel and \$ per MMBtu)



Source: BBVA Research and Haver Analytics

Figure 3. **Crude oil vs. dry gas production in the Southwest** (Bcf/d and Million barrels)



Source: BBVA Research and Haver Analytics

A domestic-oriented market

Thanks to the booming shale industry, in the last few years, the production of natural gas has been steadily increasing, reaching a historical record at 102.8 billion cubic feet per day (Bcf/d) at the end of 2019, compared to 75.5 Bcf/d at the beginning of 2017.

Nearly 17% of U.S. natural gas production comes from oil wells, which is called associated gas and considered a byproduct of crude oil production. In general, associated gas is a mixture of methane and other natural gas plant liquids (NGPL), such as ethane, propane, normal butane, and isobutene. Therefore, the "wet" part, like crude oil, can be processed and provide inputs in the petrochemical industry.

Meanwhile, since crude oil is the primary source of revenue for operators of these wells, the output of associated gas is generally driven by the production of oil, which carries higher margins (Figure 3). This is the case for natural gas produced in regions with low-permeability and tight rock formations such as the Anadarko, Bakken, Eagle Ford, Niobrara, and Permian. Among these, the Permian is the most prominent region, accounting for nearly 43% of the total production of associated gas.

Non-associated natural gas accounts for about 80% of total output. The most prominent producers are in the Appalachian region that includes the Marcellus and Utica shale plays. Most operators in this region extract natural gas

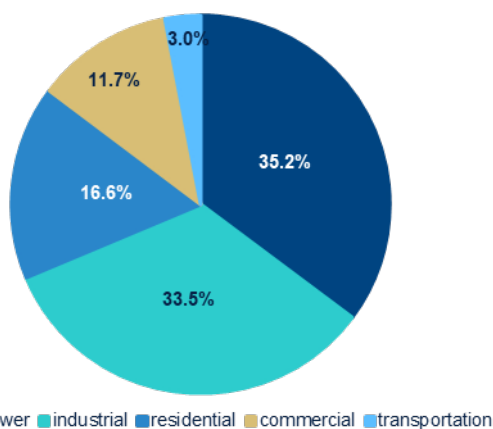
without producing any oil. Therefore, when natural gas demand is high, and the associated natural gas production is low, Appalachia producers can increase their output to seek higher profits, and in the meantime, the market can reach a new balance. In the long run, such elasticity in supply has proved to be an effective stabilizer for the natural gas market. However, in the short run, the transmission through market prices and capital investment takes roughly three quarters and thus creates a temporary over- or under-supply. This is a traditional feature of commodity markets whereby high prices incentivize production and higher production reduces market prices.

From the demand side, approximately 85% of the natural gas produced in the country is consumed within its borders. The virtual absence of international competition contributes to the stability of the natural gas market. Also, unlike crude oil and coal, which are processed to make a wide range of essential products in our daily life, natural gas is mostly used to generate heat and electricity. Therefore, the consumption of natural gas is relatively straightforward to estimate, as the energy used in industrial, commercial, utility, and residential sectors is relatively stable.

The impact of COVID-19 on the domestic market

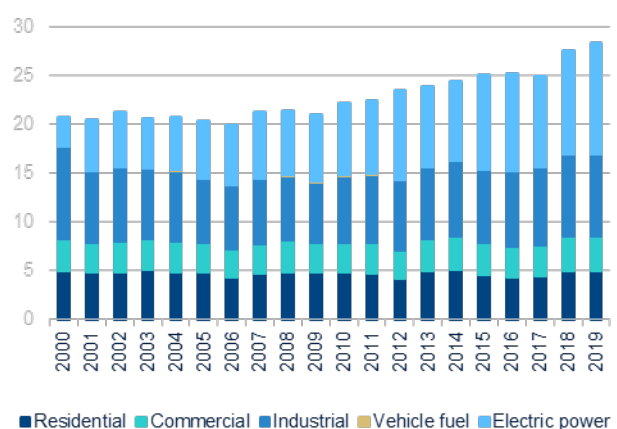
COVID-19 is expected to hurt demand through 2020. By sector, natural gas consumption in the commercial and industrial sectors may experience the most significant contraction as the economy has fallen into recession. At the end of April, U.S. electric utility output (excluding HI and AK) was just 4% lower than a year earlier. This reflects that the drop in industrial and commercial demand is being partially offset by demand in the residential sector, which has increased as people stay and work from home during the lockdowns. Moreover, demand for natural gas in the electric power sector could remain flat or even improve slightly as the share of natural gas in electricity generation continues to increase due to historically low prices and investors' increasing resistance to back coal plants. Most of the impact on natural gas consumption will be felt in the second quarter when the worst effects of the pandemic on economic activity are happening. However, as economic activity recovers in the second half of the year, so does industrial and commercial consumption of natural gas. The balance for the year, nevertheless, will be negative, and the total consumption of natural gas will decline to 83.4 Bcf/d in 2020 from 84.9 Bcf/d in 2019.

Figure 4. **U.S. natural gas consumption by sector** (share of total, %)



Source: BBVA Research and EIA

Figure 5. **U.S. natural gas consumption by sector** (trillion cubic feet)



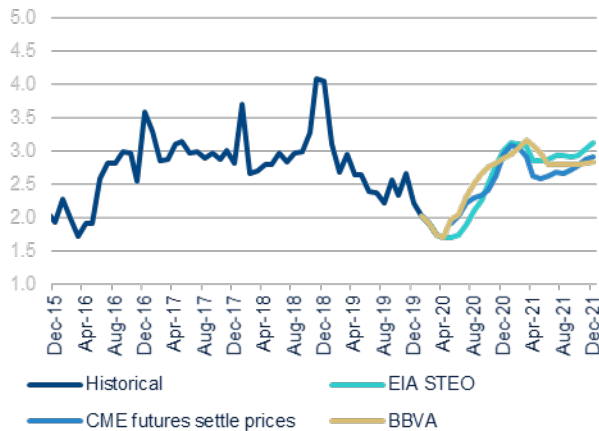
Source: BBVA Research and EIA

Likewise, we expect natural gas production to decrease due to the combined effect of the pandemic and the collapse of oil prices. The decline in oil prices is having a devastating impact on the shale oil industry, especially in places like the Permian region. Consequently, the output of the associated gas will go down with oil.

Given the relatively steady demand and elastic supply, we expect a balanced natural gas market in the medium term. However, in the short run, since the decline in oil prices is going to affect oil producers significantly, we expect associated gas production to drop from 6,707 Bcf in 2019 to 6,211 Bcf in 2020. Meanwhile, gas producers in Appalachia will need time and higher prices to increase capacity. In other words, once oil prices stabilize, we expect a rebound in natural gas prices and the non-associated gas production to gradually catch up and close the gap.

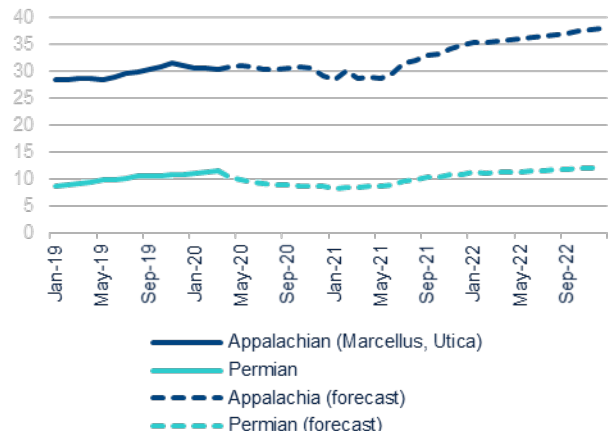
As the Appalachian region stays put before prices go up, non-associated gas production will remain relatively stable. For the whole year, we expect the non-associated gas production to inch up from 33,055 Bcf in 2019 to 33,405 Bcf in 2021 as the market rebalances. After that, the natural gas price will fall back to their equilibrium range of \$2.5 to \$3 per MMBtu.

Figure 6. **Henry Hub natural gas price forecast (\$/MMBtu)**



Source: BBVA Research and Haver Analytics

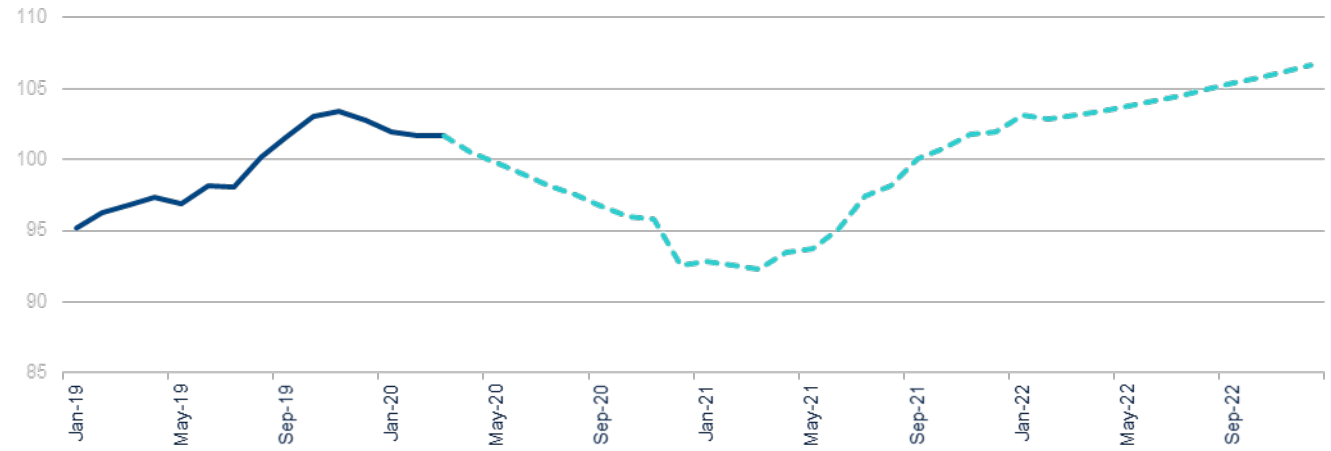
Figure 7. **Appalachia vs. Permian natural gas production (billion cubic feet per day)**



Source: BBVA Research and EIA

Based on our estimates, the total marketed production of natural gas will average 98.4 Bcf/d in 2020, with monthly production falling from 101.9 Bcf/d in January to 92.6 Bcf/d in December. Due to the delayed response from natural gas prices, total natural gas production will start to recover in the second half of 2021. Therefore, our forecast for total production averages 96.7 Bcf/d in 2021.

Figure 8. **U.S. Marketed natural gas production** (billion cubic feet per day)

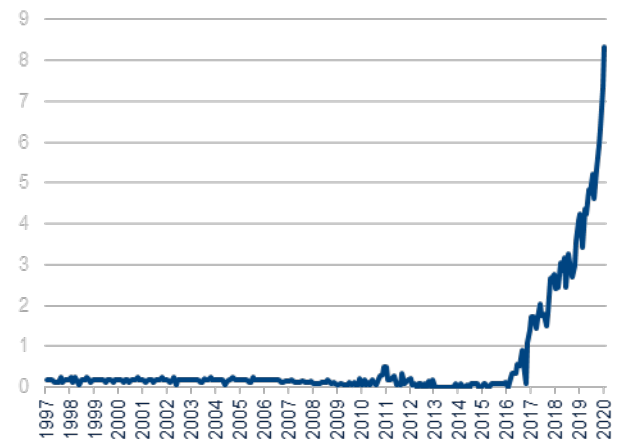


Source: BBVA Research and Haver Analytics

LNG exports

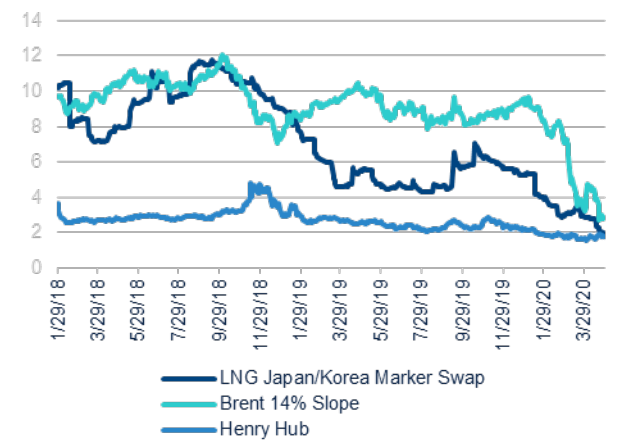
Contrary to the dry gas market, the outlook for LNG exports is driven by both domestic and international factors. U.S. LNG exports have grown exponentially over the last five years. In January 2020, they reached a new record of 8.3 Bcf/d. This reflects, to a great extent, higher price differentials. For example, in 2019, average prices for LNG exports by vessel were \$5.2 per Tcf, whereas Henry Hub prices averaged \$2.6 per Tcf. Currently, the U.S. has a 16% share of the global LNG market. Around 50% of the U.S. natural exports are LNG, with main destinations in S. Korea, Japan, and Europe.

Figure 9. **U.S. LNG exports** (billion cubic feet per day)



Source: BBVA Research and Haver Analytics

Figure 10. **LNG prices and Henry Hub** (\$/MMBtu)



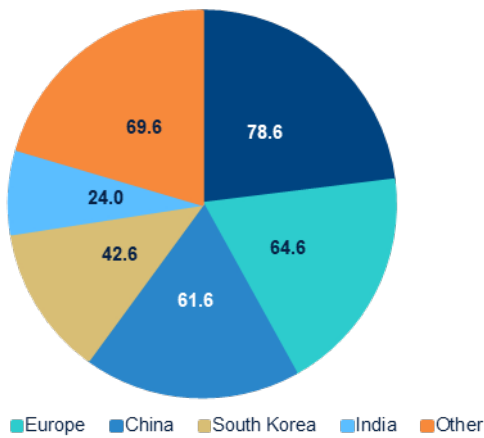
Source: BBVA Research and Bloomberg

In 2019, the global LNG supply reached a record growth of 40 million tonnes. The European market absorbed most of the new supply in order to replace a decaying production and reduce the region’s dependency on pipeline imports from Russia. However, China’s imports slowed down, and Japan and South Korea increased the use of nuclear power to produce electricity. As a result, excess supply emerged, and prices of LNG dropped significantly.

The health and economic crisis caused by COVID-19 will magnify oversupply in the short run. Demand is expected to decline in tandem with economic activity. China’s imports have weakened, while Europe may not be able to act as the buyer of last resort for another year due to potentially warmer-than-expected winters and record storage levels.

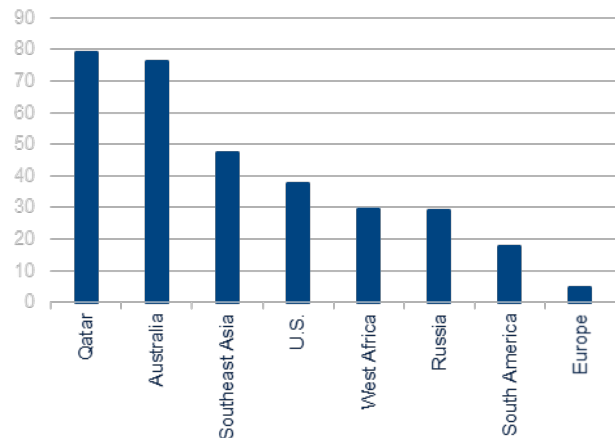
However, despite lower global demand, U.S. LNG exports will likely increase between 2 and 3 Bcf/d in 2020 as a series of new trains at Freeport, Cameron, Elba Island, and Corpus Christi start operations. However, as demand remains weak throughout the year, export terminals may lower their capacity or extend their maintenance season.

Figure 11. **LNG demand (MMtpa)**



Source: BBVA Research and Bloomberg

Figure 12. **Liquefaction capacity (MMtpa)**



Source: BBVA Research and Bloomberg

Since nearly 70%-75% of the LNG contracts are linked to oil prices, the current environment will likely keep LNG prices low for some time. Exporters will suffer from reduced revenues, while importers, who were paying relatively higher rates despite warmer winters and excess supply, stand to benefit the most.

Sluggish demand and low energy prices could force market participants to cancel contracts and delay projects waiting for a final investment decision. A portion of the 71MMt of additional liquefaction capacity announced in 2019 (from which nearly 28 MMt will take place in the U.S.) could be at risk. It is expected that by 2021, the last LNG projects under construction will be completed, and new projects will most likely be postponed. This situation will continue for a couple of years until excess supply clears out, and demand grows enough to justify new projects. As of April 2020, there were 7 LNG trains under construction (4 in TX, and 3 in LA). In addition, there are 15 projects approved but not yet under construction (6 in TX and 6 in LA). Delaying these projects would represent a foregone benefit for the local economies.

U.S. LNG exports may continue to increase beyond 2020 as demand is expected to almost double in the next twenty years, from 360Mt to 700Mt, supported by the industrial and power sectors as they continue to move away from coal. However, long-term contracts may become less attractive as warmer winters become more frequent. Producers will also face the uncertainty related to how quickly demand continues shifting toward alternative energy sources like nuclear or renewables.

Summing up

COVID-19 is expected to damage the natural gas industry. For 2020, demand will slow down in line with the economic contraction. Nevertheless, since most of the natural gas is produced and consumed domestically, the recovery will most likely be synchronized with the U.S. economic cycle. Production will adjust accordingly, especially in regions where natural gas is a byproduct of oil extraction. Nonetheless, the combination of sluggish output, higher demand in the industrial and commercial sectors, and seasonal demand from the winter season will most likely lift Henry Hub prices relative to their current low levels.

Going forward, increasing competition, low oil prices, and the prospect of warmer winters may discourage future investments for the next two to five years until excess supply clears out. In this environment, companies will continue looking for alternatives to pricing and long-term contracts. However, around the world, natural gas is expected to increase its share of the energy mix as the population grows, and more countries move away from coal to reduce pollution and lower carbon emissions. Moreover, in the long run, big data and artificial intelligence will greatly help exploring, extracting, and processing natural gas more efficiently. Therefore, the U.S. is exceptionally well-positioned to supply global markets with LNG. The negative economic impact of COVID-19 will be contained in the short run, and will not alter the structural shift towards clean and affordable energy.

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