



Energy Markets, Analysis and Standards

Energy Analysis

EA 2021-01

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Natural Gas Market Performance During the February 2021 Cold Weather Event

The recent cold weather affected large swaths of the country and drove unprecedented demand for natural gas. Local distribution companies that deliver natural gas continued to provide safe and reliable service to customers with few interruptions during this event. However, the event led to significant impacts across the industry, including commodity pricing and customers. This AGA Energy Analysis provides observations and insights on the effects of the February 2021 cold wave on the natural gas industry. This Energy Analysis constitutes a limited review of select available data. Future analyses may expand on the elements reviewed here.

Statistical Observations and Insights

From February 13 to 17, 2021, a North American cold wave and winter storm brought record-setting low temperatures to much of the continental United States. Sub-zero temperatures stretched from the Dakotas to Texas and New England. The arctic air mass led to colder-than-normal conditions in all but six states. Texas, Louisiana, Oklahoma, Mississippi, and Arkansas were twice as cold as normal based on heating degree days.¹ Daily low-temperature records were broken in Oklahoma City, Dallas, Houston, and into Arkansas and Nebraska.

The severe cold wave drove a surge in demand for both electricity and natural gas services. As a result, natural gas was called on as a fuel for electricity generation and natural gas service to end-user customers.

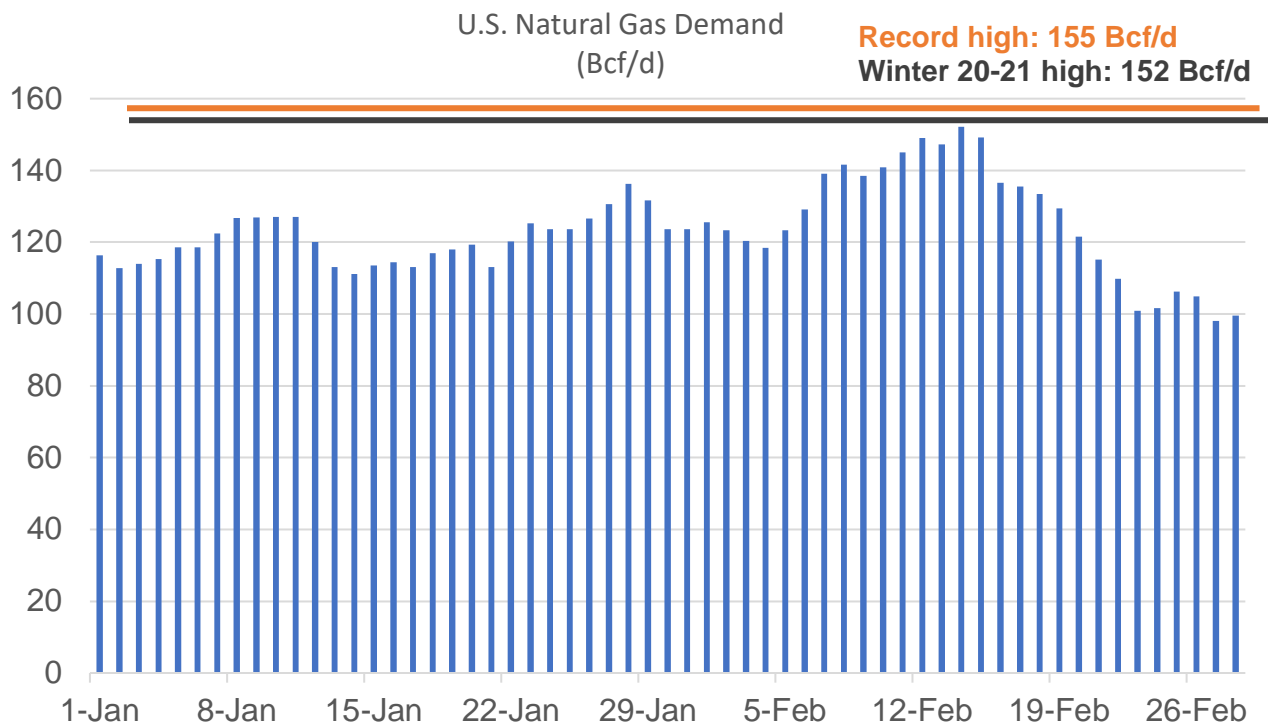
U.S. natural gas consumption set a two-day record from February 14 and 15. These values included domestic demand and exports. On February 14, U.S. natural gas demand in the lower-48 reached 152 Bcf per day, just shy of the daily record set in January 2019. Market demand on February 15 reached 149 Bcf per day. Together, the two days constituted a new two-day record.

Heating needs in the residential, commercial, and industrial sectors drove most of the demand increases. Additionally, significant requirements for natural gas-fired power generation added to consumption totals.

¹ Climate normals based on the 1971-2000 average.

Residential and commercial demand for natural gas service averaged 70 Bcf per day over February 14 and 15 and represented 46 percent of national natural gas demand. Gas flows to the power sector posted a new winter high of over 39 Bcf per day on February 15. In part driven by weather-sensitive energy loads, volumes delivered to industrial customers increased to 28 Bcf per day.

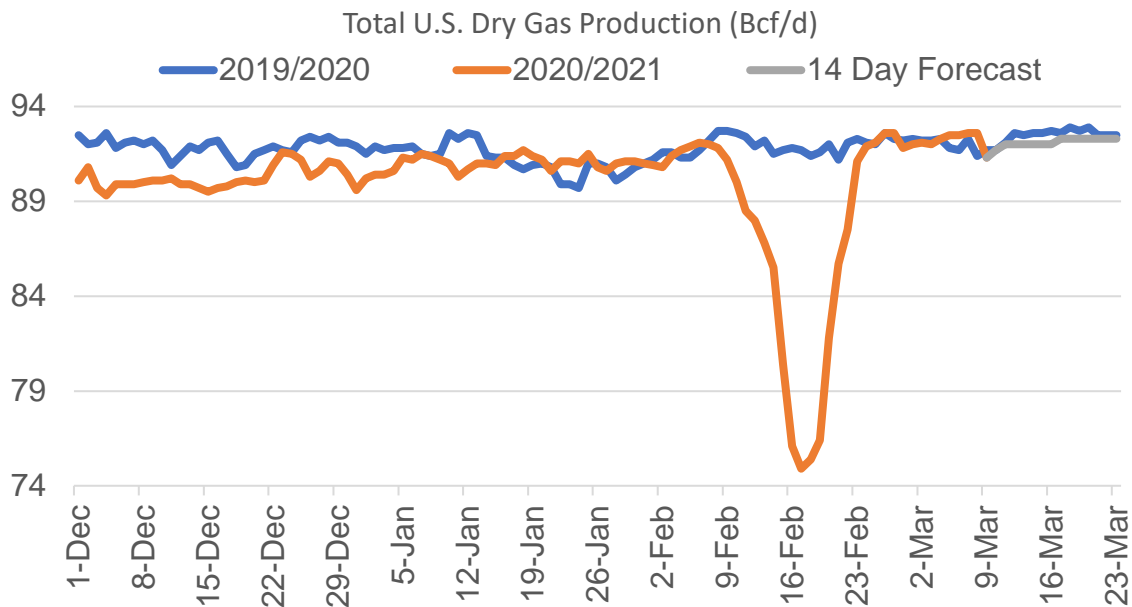
Figure 1: U.S. Natural Gas Demand, Billion Cubic Feet per Day



AGA graph created with data sourced from S&P Global Platts Analytics

The cold event also led to disruptions to some supply sources. Freeze-offs at the wellhead and declines in natural gas processing capacity reduced nationwide supply by about 20%. Interruptions to electric power in Texas and other areas also constrained supplies in instances where electricity was needed to operate natural gas production and processing infrastructure.

Figure 2: Total U.S. Dry Gas Production, Billion Cubic Feet per Day



AGA graph created with data sourced from S&P Global Platts Analytics

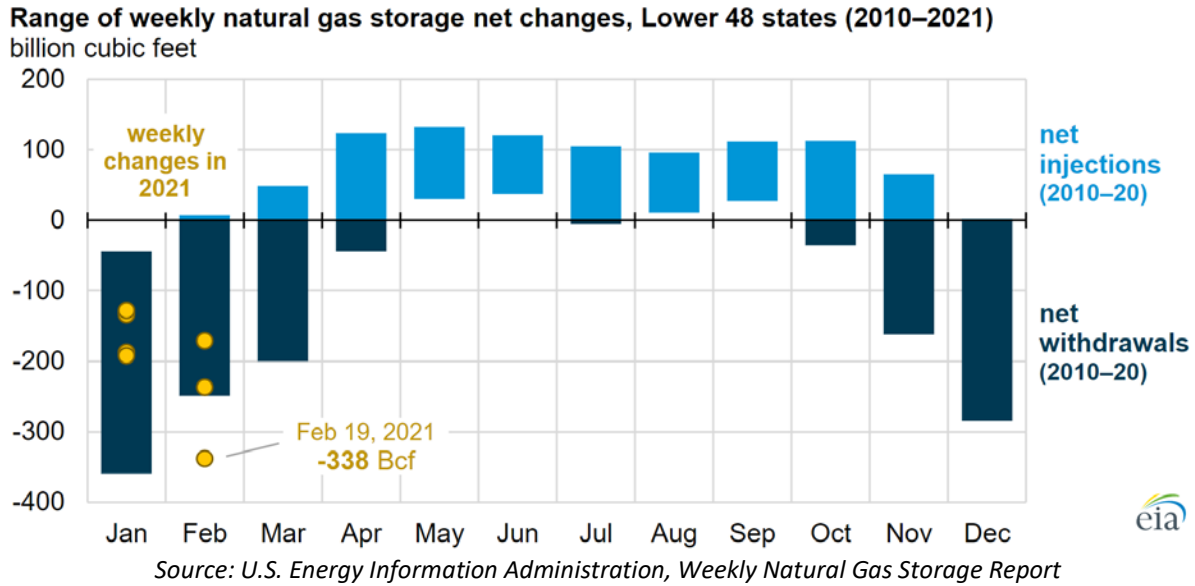
The cold event's effects also affected U.S. pipeline exports to Mexico, which fell from a high of 6.1 Bcf per day on February 10 to 3.8 Bcf per day on February 16. The majority of the declines occurred in the South Texas corridor, with reductions up to 20 percent as temperatures plummeted.

The cold temperatures had the opposite effect on imports from Canada. Following high monthly imports of 8.4 Bcf per day right after the peak of the cold weather. As temperatures ease, imports fell to 3.6 Bcf per day as cold temperatures receded by February 26.

Feedgas deliveries to US LNG export facilities also experienced sharp declines. Daily gas deliveries from pipelines connected to US LNG export facilities reached the lowest volumes on February 16, falling 78 percent from less than one week prior.

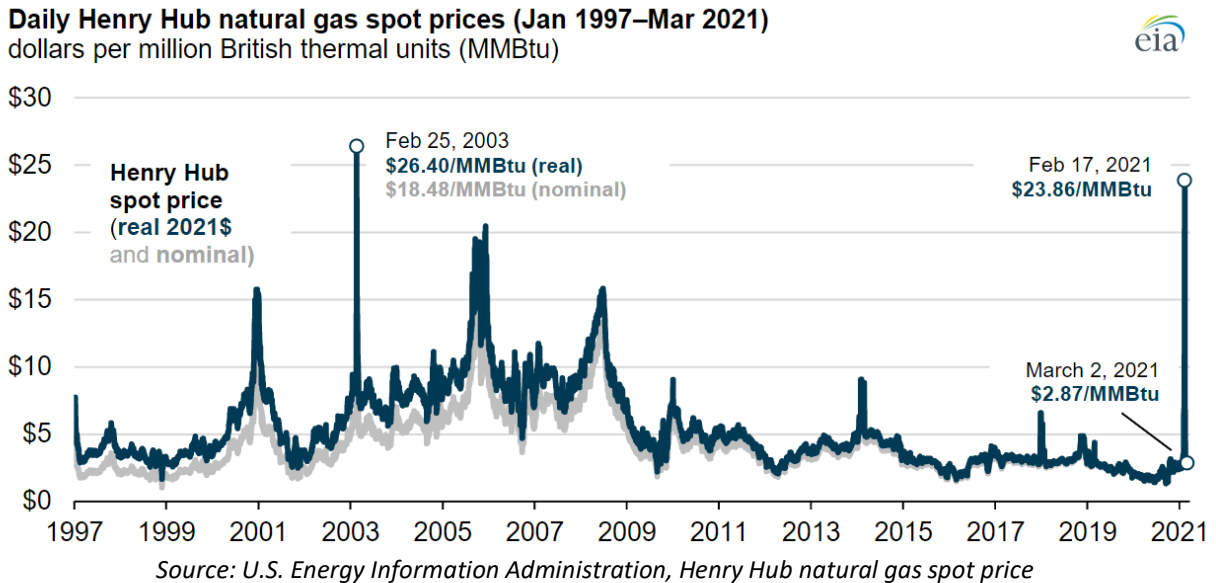
Natural gas storage played a critical role in meeting natural gas demand during the cold wave. The EIA reported that withdrawals from underground storage totaled 338 Bcf for the week ending February 19, 2021, representing the second-largest weekly withdrawal ever. Withdrawals in the U.S. South Central region, which serves Texas and surrounding markets, increased by 184 percent from two weeks earlier, for a record amount withdrawal of 156 Bcf from storage.

Figure 3: Range of Weekly Natural Gas Storage net changes, Lower-48 states (2010-2021)



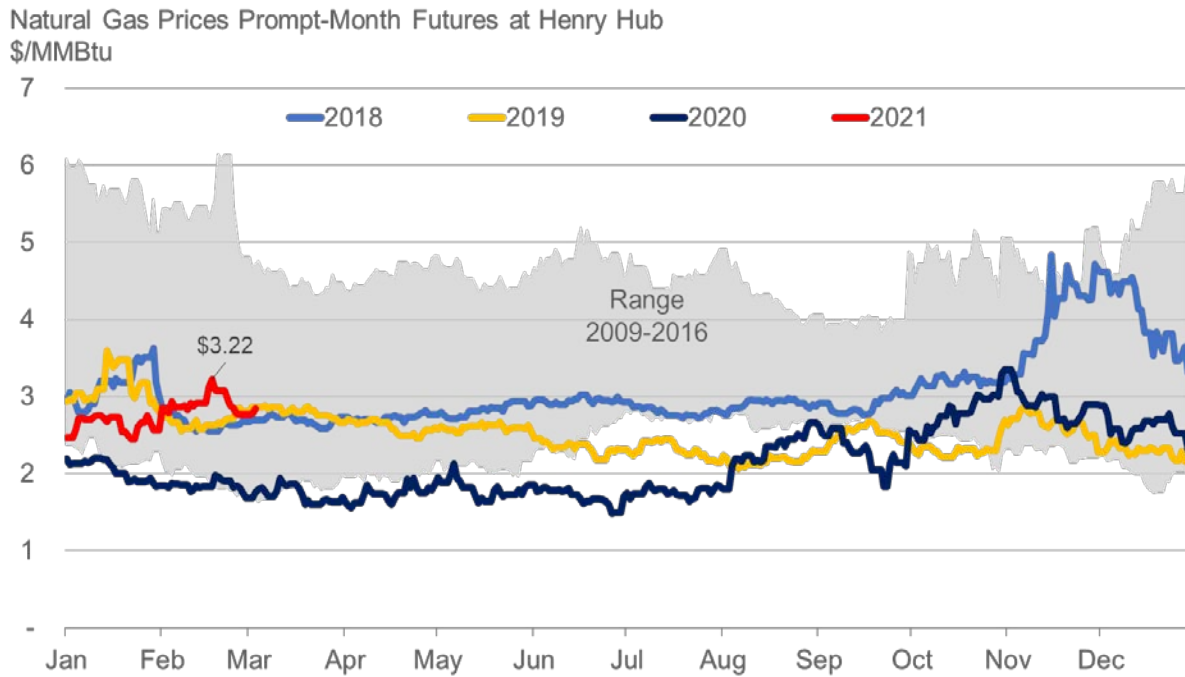
The ramp-up of gas storage withdrawals was significant. U.S. gas withdrawals during the week of February 19 increased 43% from the week prior and nearly 100% from two weeks earlier.

Figure 4: Daily Henry Hub Natural Gas Spot Prices (Jan 1997-Mar 2021), Dollars per Million British Thermal Units (MMBtu)



Conditions led to a significant increase in the spot price of natural gas in many areas. Daily natural gas spot prices at Henry Hub reached nearly \$24 per MMBtu on February 17, 2021. Other areas saw more significant increase in prices. For example, the OGT price marker in Oklahoma posted prices nearing \$1,200 per MMBtu on February 15, up from just \$9 one week prior.

Figure 5: Natural Gas Prices Prompt-Month Future at Henry Hub



Data Source: U.S. Energy Information Administration

Despite the sharp increases in daily cash prices, futures contracts faced only moderate pressure. The prompt-month futures price at Henry Hub reached a high of \$3.22 per MMBtu on February 16. For April delivery, natural gas contract prices saw a temporary increase, peaking at \$3.06 per MMBtu on February 18.

Natural gas performance in Southern US

Record sub-freezing temperatures and windchills across Texas lasting more than eight days drove significant electricity demand increases. The Texas grid operator ERCOT (Electric Reliability Council of Texas) represents 90 percent of Texas electric load. [Peak forecasted demand in ERCOT reached 76.8 GW](#) on February 15, exceeding ERCOT's planning of 67.2 GW for an extreme winter weather scenario. Controlled electrical outages were implemented to prevent a statewide blackout.

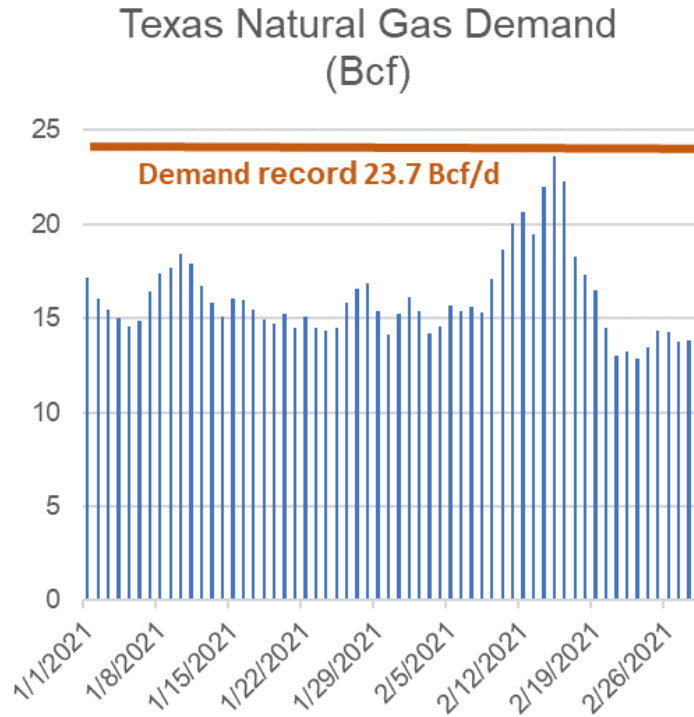
Electric generators were affected by mechanical issues, constrained gas supplies, lower than normal solar generation due to cloud cover, and limited wind generation, reportedly resulting in nearly 48.6 percent of electricity capacity generation being forced out during the height of the event.² ERCOT's operators implemented controlled outages to avoid a system-wide blackout, which led to millions without electricity during the event's coldest days. As temperatures eased, more generation was brought back online, and electricity demand requirements dropped.

Overall, Texas set a new record for natural gas consumption even with the severe challenges associated with the electric power outages. The cold drove a substantial increase in natural gas use for power generation, industrial consumption, and residential and commercial demand.

On February 15, Texas consumed a record 23.7 Bcf per day, according to S&P Global Platts Analytics. From pre-event levels, Texas daily gas flows to power generation increased 183%; residential and commercial gas demand combined increased by 238%, and industrial demand increased by 47%.

² http://www.ercot.com/content/wcm/key_documents_lists/225373/2.2_REVISIED_ERCOT_Presentation.pdf

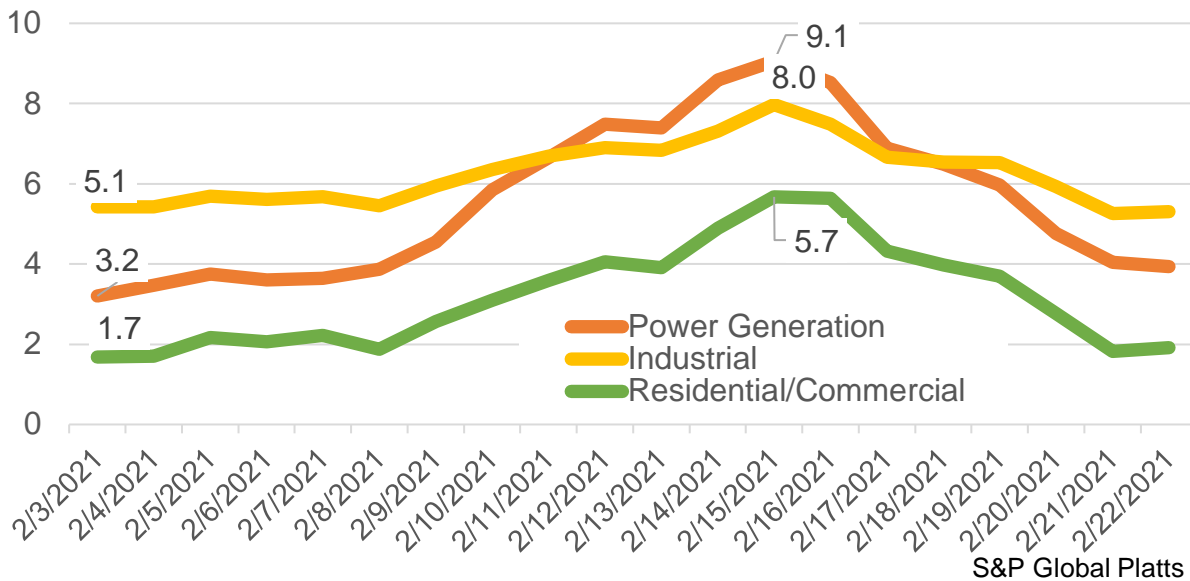
Figure 6: Texas Natural Gas Demand, Billion Cubic Feet



AGA graph created with data sourced from S&P Global Platts Analytics

Figure 7: Texas Natural Gas Demand, Feb 3 – 22, 2021 (Bcf)

Texas Natural Gas Demand, Feb 3 - 22, 2021 (Bcf)

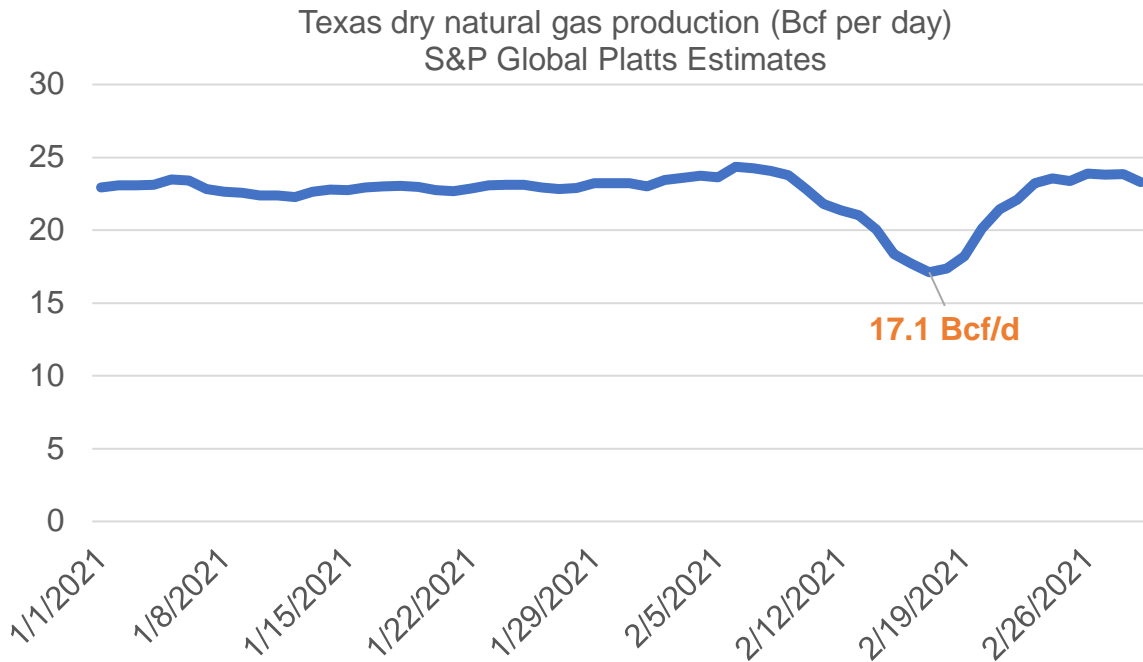


S&P Global Platts

AGA graph created with data sourced from S&P Global Platts Analytics

According to modeled estimates from S&P Global Platts Analytics, onshore natural gas production in Texas fell by 7 Bcf per day or 29%. Production declines began on February 7 and ended on February 17. The most significant daily declines in modeled production were concentrated between February 10 and 15, with the daily low reaching 17.1 Bcf per day. However, estimates for this demand decline vary. The [U.S. Energy Information Administration reported via data provided by](#) in Texas fell to a daily low of 11.8 Bcf per day on February 17.

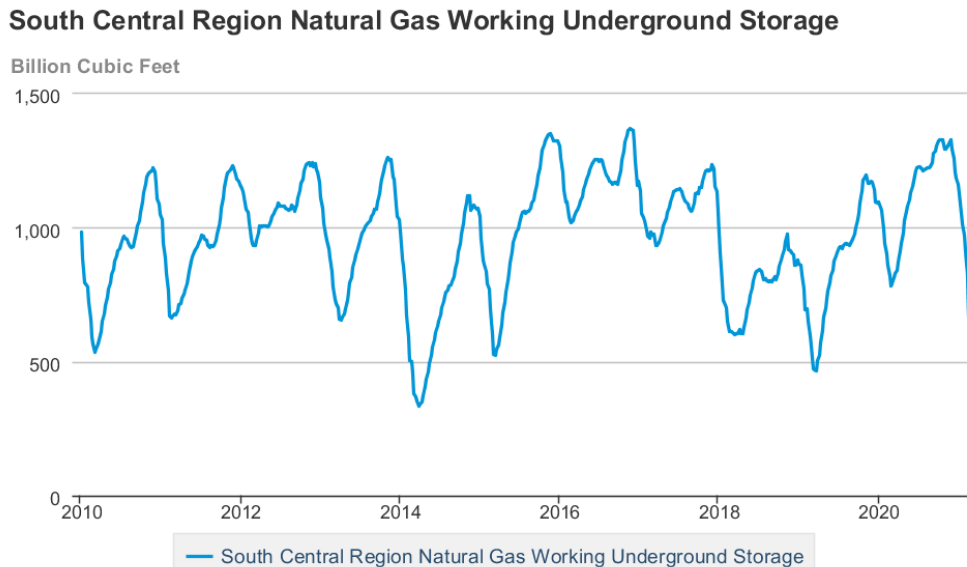
Figure 8: Texas Dry Natural Gas Production, Billion Cubic Feet per Day



AGA graph created with data sourced from S&P Global Platts Analytics

The weekly natural gas storage withdrawal in the U.S. South Central region, which serves Texas and surrounding markets, was a record draw of 156 Bcf for the week ending February 19. As with the national totals, storage withdrawals ramped up quickly. Gas flows from storage increased 184% from two weeks earlier. Daily withdrawals were likely even larger.

Figure 9: South Central Region Natural Gas Working Underground Storage



Source: Energy Information Administration

Commentary on the role of natural gas utilities in meeting winter heating season obligations

During extreme weather events, when gas utility customers need reliable gas service the most, natural gas distribution companies work hard to ensure the system remains safe and service is not interrupted. The following paragraphs focus on how distribution companies continued to provide safe, reliable gas service during the severe weather event that affected much of the U.S. on February 2021.

Natural gas utilities have over a century of experience undertaking operational planning and preparation for extreme or emergency conditions, especially winter weather. That planning and preparation proved effective when put to the test under these unprecedented weather conditions.

Over 72 million customers use natural gas across the United States for space heating, cooking, water heating, and other end-uses. Natural gas is delivered to customers by local distribution companies, which are regulated utilities subject to the regulatory compact. Under the regulatory compact, utilities are required to deliver natural gas to customers at just and reasonable rates, including during severe weather events that affect supply and demand.

Importantly, state-regulated natural gas utilities purchase gas from producers and transportation companies, receive the contracted gas at the city gates, and distribute the gas to end-use customers. As a result, most natural gas bills consist of two items:

- 1) Utilities charge each customer for all gas molecules delivered from the city gates to the customer's premises. The regulator sets the rate charged for delivery during protracted rate proceedings involving multiple intervenors. Rates set during rate proceedings cannot be unilaterally changed by the utility without regulatory approval and are not affected by supply or demand changes.
- 2) Utilities pass through to customers the cost of gas commodity purchases. Utilities do not earn a return on commodity transactions, so they are best served by keeping gas purchases as affordable as possible. However, unlike distribution rates, gas prices are set by the market and are therefore subject to supply and demand forces. Since supply and demand can be unpredictable, particularly during severe weather events, utilities have access to several tools designed to limit their customer's exposure to sharp increases to natural gas prices.

Despite the record demand and the challenges described earlier in this Energy Analysis regarding natural gas production and electricity generation, natural gas utilities continued to provide safe and reliable natural gas service to customers during this event with few interruptions. This level of service is attributable to the resiliency of the natural gas infrastructure based on years of strategic investment in these distribution systems' safety and reliability.

America's natural gas utilities invest \$91 million every day on enhancing the safety and reliability of natural gas distribution and transmission systems. This investment stems from the industry's joint efforts along with federal and state regulators, public officials, and consumers and results in the provision of service to nearly 180 million Americans.

There are curtailment rules for the natural gas utility industry that dictate how to allocate natural gas supply in the rare event that there is a limited supply available. A guiding principle of those rules is that top priority must be given to natural gas service used in buildings where people usually dwell, such as residences, hospitals, and nursing homes. Those rules ensured that human needs customers took precedence during this extreme event and incurred very few and limited interruptions to their natural gas service.

The costs associated with high commodity pricing during a winter event can affect natural gas utility customers' bills. However, natural gas utilities do not set the market pricing for natural gas, and there is no profit added to the gas cost recovered to customers. Natural gas utilities use several tools to reduce the effects of market volatility on customer bills to reliably and economically procure the commodity to provide service to its customers.

Local market conditions and geography often determine gas procurement strategies and operations management. Gas utilities employ a diverse set of contractual arrangements to procure their gas supplies, including long-term, mid-term, monthly, and daily agreements. Gas utilities also purchase gas commodities using a range of gas supply pricing mechanisms and financial tools, including physical and financial hedging mechanisms, to manage price volatility and reliability. Financial instruments such as fixed-price purchase contracts, futures, swaps, and options, allow gas supply portfolio managers to hedge or lock in a portion of the commodity cost component of gas supplies. These utilities may maintain underground natural gas storage fields, which allows for the withdrawal of natural gas from storage during peak demand periods to meet customer needs.

Many factors shape the market pricing of gas commodity and transportation services, including weather, storage levels, end-use demand, pipeline capacity, operational issues, and financial markets. These costs in the aftermath of severe weather events can be very high. The rates of natural gas utilities are regulated by the states in which they operate. Utilities may work with their state regulators to mitigate rate shocks to customers resulting from these events through special regulatory treatments, including regulatory assets, deferred purchase gas costs, or securitization.

Concluding Observations

The resiliency of the natural gas transmission and distribution system was on display throughout the middle of February 2021. While large areas of the country struggled with the effects of the polar cold event, natural gas utility companies were able to use their investments in infrastructure, operations, and planning to keep human needs customers supplied with a reliable energy source to heat their homes, even amid severe supply constraints. In addition, the natural gas utilities demonstrated the importance of their extensive storage resources during peak seasonal demand.

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