

Market News

In the News:

U.S. ammonia production is growing, and becoming less carbon intensive

Globally, ammonia production is a carbon-intensive process, and 98% of ammonia plants around the world use fossil fuels as a feedstock, primarily natural gas (72%) and coal (22%). U.S. ammonia production, the third-largest in the world behind China and Russia, is dominated by less carbon intensive natural gas-fed ammonia plants, which account for 92% of all U.S. ammonia production. Recent expansions to U.S. ammonia capacity, which have been spurred by growing natural gas production and the resulting low natural gas prices, have allowed the industry to expand domestic ammonia production while continuing the trend of reducing carbon intensity.

Growth in ammonia production and its declining carbon intensity are consistent with broader global goals of transitioning away from carbon-based fuels. In a push to decarbonize their economies, countries around the world are looking to hydrogen as an energy carrier to replace natural gas where requirements for heat or feedstock cannot be met with biofuels or electricity. Hydrogen, however, presents challenges because it requires extremely high pressure (5,000 pounds per square inch or higher) or cryogenic temperatures (below -423°F) to store and pipelines made of specialized steel to transport. Recent advances in engine and turbine technology may lead to using ammonia as a hydrogen carrier, consuming the ammonia either directly for combustion or reforming it back into nitrogen and hydrogen and using the hydrogen as industrial feedstock.

Unlike hydrogen, ammonia has the advantages of an existing broad user base and a well-developed infrastructure. In the United States, ammonia is used primarily as a fertilizer or as a feedstock in producing fertilizers (for example, urea), but its use in the chemical industry is growing. Ammonia is produced at 32 plants in 17 states and shipped around the country by pipeline, rail, barge, and truck. According to the U.S. Geological Survey, U.S. ammonia production has been increasing since 2015, rising 46% from 11.6 million metric tons per year (mt/y) to 17.0 million mt/y in 2020. With growth in domestic production outpacing growth in demand, U.S. reliance on imported ammonia has decreased from 40% in 2010 to 13% in 2020.

For ammonia to serve as a hydrogen carrier in a decarbonized economy, ammonia production would need to become carbon neutral. The Haber-Bosch process, which uses hydrogen obtained from steam methane reforming and nitrogen from the air, remains the dominant method of producing ammonia. Ammonia produced from natural gas is the primary source of U.S. ammonia production, and at approximately 1.5 billion cubic feet per day (Bcf/d) ammonia production accounted for 6.5% of all U.S. industrial natural gas consumption in 2020. Although cleaner relative to the global average, the U.S. emission rate is about 2.1 tons of carbon dioxide per every ton of ammonia produced, which includes emissions from both the combustion of natural gas for process heat and from its use as a feedstock in the steam methane reformer.

To avoid carbon emissions altogether, a plant must either sequester the carbon dioxide, resulting in *blue* ammonia, or use hydrogen produced by electrolysis of water using renewable-generated electricity, which is referred to as *green* ammonia. Currently, the United States has only one blue ammonia plant, the coal-fed Dakota Gasification Co. in Beulah, North Dakota, which captures and sequesters its emissions of carbon dioxide by piping it to nearby oil fields for enhanced oil recovery.

The newest U.S. ammonia plant, the Yara/BASF plant in Freeport, Texas, which was completed in April 2018, does not use a steam methane reformer to supply hydrogen for its Haber-Bosch process. Instead, it uses surplus hydrogen from neighboring petrochemical facilities, such as propane dehydrogenation (PDH) plants or ethylene crackers, which would normally combust the hydrogen for process heat.

CF Industries, the largest ammonia producer in the country, is planning to construct the first green ammonia plant in the United States in Donaldsonville, Louisiana. By 2023, the new plant will produce 20,000 mt/y of ammonia using hydrogen produced by electrolysis of water using renewable-generated electricity.



Weekly Update 04/06/2021

Weekly Weather Outlook

10 Day Weather - Oklahoma City, OK

As of 1:45 pm CDT

⚠ Wind Advisory >

Today	79°/52°	Partly Cloudy/Wind	6%	☁ S 27 mph	▼
Wed 07	66°/47°	Partly Cloudy/Wind	0%	☁ WNW 23 mph	▼
Thu 08	80°/55°	Sunny	0%	☁ W 13 mph	▼
Fri 09	80°/48°	PM Thunderstorms	37%	☁ SE 11 mph	▼
Sat 10	73°/51°	Sunny	2%	☁ NNW 13 mph	▼
Sun 11	80°/53°	Mostly Sunny	19%	☁ S 16 mph	▼
Mon 12	67°/45°	Partly Cloudy	24%	☁ NNE 17 mph	▼
Tue 13	64°/42°	Partly Cloudy	19%	☁ NE 13 mph	▼
Wed 14	65°/43°	Partly Cloudy	24%	☁ NNE 14 mph	▼
Thu 15	62°/45°	Showers	35%	☁ NNE 12 mph	▼
Fri 16	67°/46°	AM Showers	34%	☁ NE 12 mph	▼
Sat 17	65°/46°	Partly Cloudy	24%	☁ NNE 13 mph	▼
Sun 18	71°/48°	Partly Cloudy	21%	☁ SSE 12 mph	▼
Mon 19	71°/49°	AM Showers	32%	☁ S 13 mph	▼
Tue 20	73°/50°	Partly Cloudy	14%	☁ S 14 mph	▼

10 Day Weather - Tulsa, OK

As of 1:58 pm CDT

⚠ Wind Advisory >

Today	76°/59°	Cloudy/Wind	4%	☁ SSE 21 mph	▼
Wed 07	64°/48°	AM Thunderstorms	45%	☁ W 19 mph	▼
Thu 08	78°/53°	Sunny	1%	☁ W 15 mph	▼
Fri 09	82°/49°	Partly Cloudy	24%	☁ SSE 9 mph	▼
Sat 10	72°/49°	Sunny	6%	☁ NNW 11 mph	▼
Sun 11	82°/54°	Mostly Sunny	18%	☁ S 13 mph	▼
Mon 12	67°/45°	AM Showers	34%	☁ NNE 12 mph	▼
Tue 13	64°/42°	Partly Cloudy	22%	☁ NNE 11 mph	▼
Wed 14	66°/43°	Partly Cloudy	24%	☁ NNE 11 mph	▼
Thu 15	64°/44°	PM Showers	31%	☁ NNE 9 mph	▼
Fri 16	68°/45°	Partly Cloudy	24%	☁ NE 9 mph	▼
Sat 17	66°/46°	Partly Cloudy	24%	☁ NNE 10 mph	▼
Sun 18	70°/47°	Partly Cloudy	20%	☁ ESE 9 mph	▼
Mon 19	70°/48°	Few Showers	34%	☁ SE 10 mph	▼
Tue 20	72°/49°	Partly Cloudy	24%	☁ ESE 11 mph	▼



Weekly Update 04/06/2021

Weekly Weather Outlook

10 Day Weather - Wichita, KS

As of 1:50 pm CDT

⚠ Wind Advisory >

Today	75°/47°	Cloudy/Wind	15%	S 28 mph	⌵
Wed 07	50°/44°	PM Showers/Wind	37%	WNW 24 mph	⌵
Thu 08	74°/46°	Sunny/Wind	0%	WNW 21 mph	⌵
Fri 09	76°/42°	Partly Cloudy	18%	NNE 18 mph	⌵
Sat 10	68°/46°	Sunny	8%	NW 13 mph	⌵
Sun 11	79°/46°	Sunny	14%	SSW 17 mph	⌵
Mon 12	63°/39°	Partly Cloudy	22%	N 17 mph	⌵
Tue 13	61°/39°	Partly Cloudy	20%	N 15 mph	⌵
Wed 14	63°/40°	Partly Cloudy	19%	N 15 mph	⌵
Thu 15	62°/42°	Partly Cloudy	24%	N 13 mph	⌵
Fri 16	64°/43°	PM Showers	36%	SE 14 mph	⌵
Sat 17	66°/42°	Partly Cloudy	16%	N 14 mph	⌵
Sun 18	67°/44°	Partly Cloudy	19%	SSE 15 mph	⌵
Mon 19	69°/46°	Partly Cloudy	24%	SSE 15 mph	⌵

10 Day Weather - Kansas City, KS

As of 2:02 pm CDT

Today	78°/62°	Isolated Thunderstorms/Wind	33%	S 20 mph	⌵
Wed 07	64°/46°	AM Thunderstorms	58%	SSW 15 mph	⌵
Thu 08	53°/44°	Rain	67%	W 17 mph	⌵
Fri 09	73°/44°	Partly Cloudy	7%	WNW 10 mph	⌵
Sat 10	64°/44°	Partly Cloudy	24%	NW 14 mph	⌵
Sun 11	77°/48°	Mostly Sunny	8%	SSW 13 mph	⌵
Mon 12	59°/39°	AM Showers	32%	NNW 14 mph	⌵
Tue 13	59°/39°	Mostly Sunny	17%	NNW 14 mph	⌵
Wed 14	61°/39°	Partly Cloudy	7%	NNW 12 mph	⌵
Thu 15	61°/40°	Partly Cloudy	13%	N 11 mph	⌵
Fri 16	64°/43°	Partly Cloudy	24%	NE 11 mph	⌵
Sat 17	63°/42°	Partly Cloudy	16%	N 13 mph	⌵
Sun 18	65°/43°	Partly Cloudy	20%	N 12 mph	⌵
Mon 19	67°/45°	Partly Cloudy	24%	SSW 12 mph	⌵
Tue 20	68°/45°	Partly Cloudy	21%	SSE 13 mph	⌵



Weekly Update 04/06/2021

Weekly Natural Gas Storage Report

for week ending March 26, 2021 | Released: April 1, 2021 at 10:30 a.m. | Next Release: April 8, 2021

Working gas in underground storage, Lower 48 states

[Summary text](#) [CSV](#) [JSN](#)

Region	Stocks billion cubic feet (Bcf)				Historical Comparisons			
	03/26/21	03/19/21	net change	implied flow	Year ago (03/26/20)		5-year average (2016-20)	
					Bcf	% change	Bcf	% change
East	307	307	0	0	384	-20.1	310	-1.0
Midwest	401	405	-4	-4	478	-16.1	407	-1.5
Mountain	112	112	0	0	92	21.7	106	5.7
Pacific	194	193	1	1	197	-1.5	189	2.6
South Central	749	734 R	15	15	838	-10.6	787	-4.8
Salt	226	215	11	11	256	-11.7	239	-5.4
Nonsalt	523	519 R	4	4	583	-10.3	548	-4.6
Total	1,764	1,750 R	14	14	1,989	-11.3	1,800	-2.0

R=Revised.

The reported revision caused the stocks for March 19, 2021 to change from 1,746 Bcf to 1,750 Bcf. As a result, the implied net change between the weeks ending March 12 and March 19 changed from -36 Bcf to -32 Bcf.

Totals may not equal sum of components because of independent rounding.

Supply table

Demand table

Daily supply/demand graph

U.S. natural gas supply - Gas Week: (3/25/21 - 3/31/21)

	Average daily values (Bcf/d):		
	this week	last week	last year
Marketed production	103.3	103.1	106.2
Dry production	91.3	91.1	93.3
Net Canada imports	4.1	4.4	3.9
LNG pipeline deliveries	0.1	0.1	0.1
Total supply	95.4	95.6	97.3

Source: IHS Markit

Note: LNG pipeline deliveries represent natural gas sendout from LNG import terminals.



Weekly Update 04/06/2021

Rigs graph		Rigs table		
Rigs				
			Change from	
	Tue, March 23, 2021	last week	last year	
Oil rigs	324	1.9%	-48.1%	
Natural gas rigs	92	0.0%	-9.8%	
Note: Excludes any miscellaneous rigs				
Rig numbers by type				
			Change from	
	Tue, March 23, 2021	last week	last year	
Vertical	22	-12.0%	-21.4%	
Horizontal	380	2.2%	-41.8%	
Directional	15	7.1%	-68.1%	
Source: Baker Hughes Co.				

Temp. table		Average temp.		Diff. b/w average and normal		
Temperature – heating & cooling degree days (week ending Mar 25)						
		HDD deviation from:			CDD deviation from:	
Region	HDD Current	normal	last year	CDD Current	normal	last year
New England	146	-41	-27	0	0	0
Middle Atlantic	133	-39	-19	0	0	0
E N Central	118	-62	-63	0	0	0
W N Central	138	-39	-42	0	-1	0
South Atlantic	83	-15	21	10	-2	-17
E S Central	68	-24	13	2	-3	-9
W S Central	57	3	23	7	-6	-22
Mountain	164	16	2	1	-2	1
Pacific	108	22	-12	0	-1	0
United States	113	-23	-19	3	-2	-6
Note: HDD = heating degree day; CDD = cooling degree day						
Source: National Oceanic and Atmospheric Administration						

Overview

Overview:

(For the week ending Wednesday, March 24, 2021)

- Natural gas spot prices rose at most locations this report week (Wednesday, March 24 to Wednesday, March 31). The Henry Hub spot price rose from \$2.45 per million British thermal units (MMBtu) last Wednesday to \$2.49/MMBtu yesterday.
- At the New York Mercantile Exchange (NYMEX), the April 2021 contract expired Monday at \$2.586/MMBtu, up 7¢/MMBtu from last Wednesday. The May 2021 contract price increased to \$2.608/MMBtu, up 4¢/MMBtu from last Wednesday to yesterday. The price of the 12-month strip averaging May 2021 through April 2022 futures contracts climbed 4¢/MMBtu to \$2.782/MMBtu.
- The net injections to working gas totaled 14 billion cubic feet (Bcf) for the week ending March 26. Working natural gas stocks totaled 1,764 Bcf, which is 11% lower than the year-ago level and 2% lower than the five-year (2016–2021) average for this week.
- The natural gas plant liquids (NGPL) composite price at Mont Belvieu, Texas, rose by 5¢/MMBtu, averaging \$7.51/MMBtu for the week ending March 31. Similar to average weekly crude oil prices, which remained flat week over week, NGPL prices moved within a narrow band. The prices of natural gasoline, ethane, propane, and butane all rose by 1%. The price of isobutane remained flat week over week.
- According to Baker Hughes, for the week ending Tuesday, March 23, the natural gas rig count remained flat at 92. The number of oil-directed rigs rose by 6 to 324. The number of oil-directed rigs for the last week of March was 144 higher than for the last week of July 2020. This increase is consistent with rising crude oil prices, which rose from an average of \$42.83/barrel in July 2020 to an average of \$66.65/barrel in March 2021. The Permian Basin has seen the strongest growth in rig count and rose by 5 in the last week of March. The total rig count increased by 6, and it now stands at 417.

Prices/Supply/Demand:

Prices in most markets increase slightly week over week, reflecting mixed weather across the country. The Henry Hub spot price moved only slightly throughout the report week (Wednesday, March 24 to Wednesday, March 31), rising 4¢ per million British thermal units (MMBtu) from \$2.45/MMBtu last Wednesday to \$2.49/MMBtu yesterday after reaching a high of \$2.51/MMBtu on Monday.

Prices in the Northwest rose. Sustained below-normal temperatures across the region resulted in elevated demand and higher prices. At the Sumas border crossing, the main delivery point for natural gas into the Northwest, the price increased 26¢/MMBtu from \$2.30/MMBtu last Wednesday to \$2.56/MMBtu yesterday. Temperatures in Seattle remained in the mid-40's, which was, on average, 5°F below normal.

Cooling trend across the Great Lakes resulted in higher Midwest prices at the end of the report week. After staying well above normal for most of the report week, temperatures in the Midwest fell sharply yesterday. Yesterday's reported temperature in Chicago fell to 39°F, 4°F below normal, from an average of 59°F (16°F above normal) on Tuesday. Natural Gas Intelligence's Midwest regional average price stayed relatively flat through most of the week, moving within a 6¢/MMBtu range relative to last Wednesday's price of \$2.32/MMBtu. The Midwest regional price fell to a low of \$2.30/MMBtu last Friday and rose to \$2.38/MMBtu on Tuesday before rising sharply to \$2.51/MMBtu yesterday. At the Chicago Citygate, the price increased 21¢ from \$2.34/MMBtu last Wednesday to \$2.55/MMBtu yesterday with a low of \$2.30/MMBtu on Friday.

(Continued)

Overview

California prices rise slightly as pipeline maintenance-induced constraints remain. Temperatures across California rose to above normal for the week, easing heating demand relative to the previous week, when below-normal temperatures were recorded in both major California markets. Continuing maintenance at the Bethany Compressor Station near the Bay Area, on PG&E system's Line 400, reduced flows on the pipeline to 69% of normal capacity and limited withdrawals from storage facilities along the pipeline path. The price at PG&E Citygate in Northern California rose 2¢, up from \$3.62/MMBtu last Wednesday to \$3.64/MMBtu yesterday, after reaching a weekly low of \$3.59 on Friday. The price at SoCal Citygate in Southern California increased 3¢ from \$2.97/MMBtu last Wednesday to \$3.00/MMBtu yesterday after falling to \$2.61/MMBtu on Monday.

Forecast cooler temperatures through the end of the week push up prices across the Northeast. At the Algonquin Citygate, which serves Boston-area consumers, the price went up 61¢ from \$1.93/MMBtu last Wednesday to \$2.54/MMBtu yesterday. At the Transcontinental Pipeline Zone 6 trading point for New York City, the price increased 64¢ from \$1.79/MMBtu last Wednesday to \$2.43/MMBtu yesterday. Both pricing points reported lowest prices for the report week on Friday at \$1.80/MMBtu and \$1.61/MMBtu, respectively.

Prices in the Appalachia Basin-producing region also rise, moved higher by an anticipated rise in demand in the Northeast. The Tennessee Zone 4 Marcellus spot price increased 31¢ from \$1.68/MMBtu last Wednesday to \$1.99/MMBtu yesterday. The price at Dominion South in southwest Pennsylvania rose 37¢ from \$1.75/MMBtu last Wednesday to \$2.12/MMBtu yesterday. Reflecting the same trend as prices in the Northeast demand region, prices at both hubs fell to weekly lows on Friday to \$1.40/MMBtu at Tennessee Zone 4 and \$1.70/MMBtu at Dominion South.

Prices in the Permian production region decrease slightly, bucking the national trend of rising prices this report week. IHS Markit reports average weekly production in West Texas continuing to rise, surpassing an estimated 8.5 billion cubic feet per day (Bcf/d) for the first time since the second week of February. Increasing crude oil prices are supporting Permian drilling activity, as the number of oil-directed rigs in the Permian Basin rises. The growth in crude oil directed activity in turn supports growth in natural gas production, resulting in the price at the Waha Hub in West Texas falling 3¢/MMBtu this report week, from \$2.31/MMBtu last Wednesday to \$2.28/MMBtu yesterday. The discount between the Waha Hub and the Henry Hub natural gas prices expanded from 14¢/ last Wednesday to 21¢/MMBtu yesterday.

U.S. production rises slightly week-over-week. According to data from IHS Markit, the average total supply of natural gas fell by 0.1% compared with the previous report week. Dry natural gas production grew by 0.2% compared with the previous report week, reaching an average of 91.3 Bcf/d, about 2.0 Bcf/d lower than this time last year. Average net imports from Canada decreased by 6.7% from last week.

U.S. demand declines again week over week due to mild temperatures. Total U.S. consumption of natural gas fell by 6.0% compared with the previous report week, according to data from IHS Markit. Natural gas consumed for power generation climbed 1.4% week over week. Industrial sector consumption decreased 1.9% week over week. The largest decrease in consumption came from the residential and commercial sectors, where consumption declined by 17.1% due to above-average temperatures and low heating demand in the eastern United States for much of last report week. Natural gas exports to Mexico increased 2.6%. Natural gas deliveries to U.S. liquefied natural gas (LNG) export facilities (LNG pipeline receipts) were flat from last week's level of 11.6 Bcf/d.

U.S. LNG exports increase week over week. Twenty-four liquefied natural gas (LNG) vessels (eight from Sabine Pass, six from Freeport, five from Corpus Christi, three from Cameron, and two from Cove Point) with a combined LNG-carrying capacity of 87 Bcf departed the United States between March 25 and March 31, 2021, according to shipping data provided by Bloomberg Finance, L.P.

(Continued)

Weekly Update 04/06/2021

Overview

Storage:

The net injections into storage totaled 14 Bcf for the week ending March 26, compared with the five-year (2016–2021) average net withdrawals of 24 Bcf and last year's net withdrawals of 20 Bcf during the same week. Working natural gas stocks totaled 1,764 Bcf, which is 36 Bcf lower than the five-year average and 225 Bcf lower than last year at this time.

According to *The Desk* survey of natural gas analysts, estimates of the weekly net change to working natural gas stocks ranged from net injections of 11 Bcf to 41 Bcf, with a median estimate of 21 Bcf.

More storage data and analysis can be found on the [Natural Gas Storage Dashboard](#) and the [Weekly Natural Gas Storage Report](#).