

NITROGEN (FIXED)—AMMONIA

(Data in thousand metric tons of contained nitrogen unless otherwise noted)

Domestic Production and Use: Ammonia was produced by 16 companies at 35 plants in 16 States in the United States during 2020; 2 additional plants were idle for the entire year. About 60% of total U.S. ammonia production capacity was in Louisiana, Oklahoma, and Texas because of their large reserves of natural gas, the dominant domestic feedstock for ammonia. In 2020, U.S. producers operated at about 85% of rated capacity. The United States was one of the world's leading producers and consumers of ammonia. Urea, ammonium nitrate, nitric acid, ammonium phosphates, and ammonium sulfate were, in descending order of importance, the major derivatives of ammonia produced in the United States.

Approximately 88% of apparent domestic ammonia consumption was for fertilizer use, including anhydrous ammonia for direct application, urea, ammonium nitrates, ammonium phosphates, and other nitrogen compounds. Ammonia also was used to produce explosives, plastics, synthetic fibers and resins, and numerous other chemical compounds.

Salient Statistics—United States:

	2016	2017	2018	2019	2020^e
Production ¹	10,200	11,600	13,100	13,500	14,000
Imports for consumption	3,840	3,090	2,530	2,020	2,000
Exports	183	612	224	338	400
Consumption, apparent ²	13,800	14,100	15,300	15,200	16,000
Stocks, producer, yearend	400	320	490	420	400
Price, average, free on board gulf coast, ³ dollars per short ton	267	247	281	232	220
Employment, plant, number ^e	1,300	1,500	1,600	1,600	1,600
Net import reliance ⁴ as a percentage of apparent consumption	27	18	14	11	10

Recycling: None.

Import Sources (2016–19): Trinidad and Tobago, 65%; Canada 30%; Venezuela, 3%; and other, 2%.

Tariff:	Item	Number	Normal Trade Relations 12–31–20
	Ammonia, anhydrous	2814.10.0000	Free.
	Urea	3102.10.0000	Free.
	Ammonium sulfate	3102.21.0000	Free.
	Ammonium nitrate	3102.30.0000	Free.

Depletion Allowance: Not applicable.

Government Stockpile: None.

Events, Trends, and Issues: The Henry Hub spot natural gas price ranged between \$1.34 and \$2.52 per million British thermal units for most of the year, with an average of about \$2.07 per million British thermal units. Natural gas prices in 2020 were lower than those in 2019—a result of mild weather that decreased demand for natural gas for heating in early 2020 and reduced manufacturing activity. The U.S. Department of Energy, Energy Information Administration, projected that Henry Hub natural gas spot prices would average higher than \$3.00 per million British thermal units in 2021.

The weekly average gulf coast ammonia price was \$220 per short ton at the beginning of 2020, decreased to \$205 per short ton in mid-June, and then increased to \$228 per short ton in early October. The average ammonia price for 2020 was estimated to be \$220 per short ton. In 2020, low natural gas prices resulted in lower ammonia prices.

A long period of stable and low natural gas prices in the United States has made it economical for companies to upgrade existing ammonia plants and construct new nitrogen facilities. The additional capacity has reduced ammonia imports. Expansion in the ammonia industry took place throughout the past 5 years; however, no additional ammonia plants are expected to be commissioned before 2022.

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Global ammonia capacity is expected to increase by a total of 4% during the next 4 years. Capacity additions are expected in Africa and south Asia; however, ongoing plant closures will decrease capacity in east Asia and Latin America. Demand for ammonia is expected to increase in all regions with the largest increases expected in Africa, central Asia, and Eastern Europe.

Large corn plantings maintain the continued demand for nitrogen fertilizers. According to the U.S. Department of Agriculture, U.S. corn growers planted 37.2 million hectares of corn in the 2020 crop-year (July 1, 2019, through June 30, 2020), which was 3% greater than the area planted in crop-year 2019. Corn acreage in the 2021 crop-year is expected to increase because of anticipated higher returns for corn compared with those of other crops.

In 2020, the fertilizer industry was considered part of the critical chemical sector by the U.S. Department of Homeland Security. The COVID-19 pandemic stay-at-home orders issued in March 2020 did not affect the fertilizer industry, and U.S. ammonia plants maintained full operations.

World Ammonia Production and Reserves:

	Plant production		Reserves ⁵
	<u>2019</u>	<u>2020^e</u>	
United States	13,500	14,000	Available atmospheric nitrogen and sources of natural gas for production of ammonia are considered adequate for all listed countries.
Algeria	2,200	2,200	
Australia	1,300	1,300	
Canada	3,940	3,900	
China	38,000	38,000	
Egypt	4,200	4,500	
Germany	2,420	2,400	
India	12,200	13,000	
Indonesia	5,000	5,000	
Iran	3,500	3,500	
Netherlands	2,200	2,200	
Oman	1,700	1,700	
Pakistan	3,100	3,100	
Poland	2,200	2,200	
Qatar	3,150	3,200	
Russia	15,000	15,000	
Saudi Arabia	4,000	4,000	
Trinidad and Tobago	4,480	4,300	
Ukraine	1,500	1,500	
Uzbekistan	1,100	1,100	
Vietnam	1,100	1,100	
Other countries	<u>16,400</u>	<u>17,000</u>	
World total (rounded)	142,000	144,000	

World Resources:⁵ The availability of nitrogen from the atmosphere for fixed nitrogen production is unlimited. Mineralized occurrences of sodium and potassium nitrates, such as those found in the Atacama Desert of Chile, contribute minimally to the global nitrogen supply.

Substitutes: Nitrogen is an essential plant nutrient that has no substitute. No practical substitutes for nitrogen explosives and blasting agents are known.

^eEstimated.

¹Source: The Fertilizer Institute; data adjusted by the U.S. Geological Survey.

²Defined as production + imports – exports + adjustments for industry stock changes.

³Source: Green Markets.

⁴Defined as imports – exports + adjustments for industry stock changes.

⁵See Appendix C for resource and reserve definitions and information concerning data sources.