

## NITROGEN (FIXED)—AMMONIA

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

**Domestic Production and Use:** Ammonia was produced by 15 companies at 34 plants in 16 States in the United States during 2018; 2 additional plants were idle for the entire year. About 50% of total U.S. ammonia production capacity was located in Louisiana, Oklahoma, and Texas because of their large reserves of natural gas, the dominant domestic feedstock for ammonia. In 2018, U.S. producers operated at about 75% of rated capacity. The United States was one of the world's leading producers and consumers of ammonia. Urea, ammonium nitrate, ammonium phosphates, nitric acid, 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.

<b>Salient Statistics—United States:</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018<sup>e</sup></b>
Production	19,330	19,590	110,200	111,600	12,500
Imports for consumption	4,150	4,320	3,840	3,090	2,600
Exports	111	93	183	612	430
Consumption, apparent <sup>2</sup>	13,300	13,700	13,800	14,100	14,600
Stocks, producer, yearend	280	420	400	320	400
Price, dollars per short ton, average, f.o.b. Gulf Coast <sup>3</sup>	531	481	267	247	280
Employment, plant, number <sup>e</sup>	1,200	1,200	1,300	1,500	1,600
Net import reliance <sup>4</sup> as a percentage of apparent consumption	30	30	26	18	14

**Recycling:** None.

**Import Sources (2014–17):** Trinidad and Tobago, 66%; Canada, 23%; Russia, 4%; Venezuela, 4%; and other, 3%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–18</b>
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 \$2.48 and \$6.88 per million British thermal units for most of the year, with an average of about \$3.00 per million British thermal units. Natural gas prices in 2018 were relatively stable; slightly higher prices were a result of increased demand for natural gas owing to cold temperatures and associated increased demand for power generation. The U.S. Department of Energy, Energy Information Administration, projected that Henry Hub natural gas spot prices would average \$3.12 per million British thermal units in 2019.

The weekly average Gulf Coast ammonia price was \$290 per short ton at the beginning of 2018, decreased to \$210 per short ton in early June, and then increased to \$322 per short ton in October. The average ammonia price for 2018 was estimated to be \$280 per short ton. Increased ammonia prices were a result of an improved urea market and rising production costs in Europe.

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 plan for the construction of new nitrogen projects. The additional capacity has reduced ammonia imports. In 2017, ammonia facilities in Iowa, Louisiana, and Texas became operational. In 2018, one new ammonia facility in Texas became operational. No other ammonia plants are expected to be commissioned before 2022. Two U.S. ammonia producers completed their merger in January 2018. The new company accounted for 18% of the U.S. ammonia production capacity.

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Global ammonia capacity is expected to increase by a total of 6% during the next 3 years. In addition to increases in North America, capacity additions are expected in Africa, Central Asia, Eastern Europe, and Southeast Asia. Increased demand for ammonia is expected in Latin America and South Asia as a result of regional nitrogen deficits.

Large corn plantings maintain the continued demand for nitrogen fertilizers. According to the U.S. Department of Agriculture, U.S. corn growers planted 36.1 million hectares of corn in the 2018 crop-year (July 1, 2017, through June 30, 2018), which was slightly less than the area planted in 2017. Corn acreage in the 2019 crop-year is expected to remain about the same in most States because of anticipated higher returns for corn compared with other crops.

### World Ammonia Production and Reserves:

	Plant production		Reserves <sup>5</sup>
	2017	2018 <sup>e</sup>	
United States	11,600	12,500	Available atmospheric nitrogen and sources of natural gas for production of ammonia are considered adequate for all listed countries.
Algeria	2,100	2,100	
Australia	1,300	1,300	
Belarus	1,050	1,100	
Brazil	1,000	1,000	
Canada	3,750	3,800	
China	43,600	44,000	
Egypt	2,800	2,800	
France	1,010	1,000	
Germany	2,500	2,500	
India	10,800	11,000	
Indonesia	5,000	6,000	
Iran	2,640	2,600	
Netherlands	2,300	2,300	
Oman	1,700	1,700	
Pakistan	3,300	3,300	
Poland	2,340	2,300	
Qatar	3,220	3,200	
Russia	14,000	14,000	
Saudi Arabia	3,820	4,000	
Trinidad and Tobago	4,140	4,100	
Uzbekistan	1,100	1,100	
Vietnam	1,100	1,100	
Other countries	<u>15,400</u>	<u>15,000</u>	
World total (rounded)	142,000	140,000	

**World Resources:** The availability of nitrogen from the atmosphere for fixed nitrogen production is unlimited. Mineralized occurrences of sodium and potassium nitrates, 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.

<sup>e</sup>Estimated.

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

<sup>2</sup>Defined as production + imports – exports + adjustments for industry stock changes.

<sup>3</sup>Source: Green Markets.

<sup>4</sup>Defined as imports – exports + adjustments for industry stock changes.

<sup>5</sup>See Appendix C for resource and reserve definitions and information concerning data sources.