

NITROGEN (FIXED)—AMMONIA

(Data in thousand metric tons, nitrogen content, unless otherwise specified)

Domestic Production and Use: Ammonia was produced by 17 companies at 36 plants in 17 States in the United States during 2023; 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 2023, the U.S. plants actively producing ammonia operated at about 90% 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 quantity produced, 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:

| | 2019 | 2020 | 2021 | 2022 | 2023^e |
|--|-------------|-------------|-------------|-------------|-------------------------|
| Production ¹ | 13,500 | 14,000 | 12,700 | 13,800 | 14,000 |
| Imports for consumption | 2,020 | 1,990 | 2,080 | 1,930 | 1,800 |
| Exports | 338 | 369 | 231 | 720 | 1,000 |
| Consumption, apparent ² | 15,200 | 15,700 | 14,600 | 14,800 | 15,000 |
| Stocks, producer, yearend | 420 | 310 | 270 | 440 | 420 |
| Price, average, free on board Gulf Coast, ³ dollars per short ton | 232 | 213 | 578 | 1,070 | 480 |
| Employment, plant, number ^e | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 |
| Net import reliance ⁴ as a percentage of apparent consumption | 11 | 11 | 13 | 7 | 6 |

Recycling: None.

Import Sources (2019–22): Trinidad and Tobago, 54%; Canada, 44%; and other, 2%.

| Tariff: | Item | Number | Normal Trade Relations 12–31–23 |
|----------------|--------------------|---------------|--|
| | 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 \$1.70 and \$3.80 per million British thermal units for most of the year, with an average of about \$2.60 per million British thermal units. Natural gas prices in 2023 were lower than those in 2022—a result of above-average storage levels of natural gas and warmer-than-average winter weather. The Energy Information Administration, U.S. Department of Energy, projected that Henry Hub natural gas spot prices would average around \$3.25 per million British thermal units in 2024.

The weekly average Gulf Coast ammonia price was \$885 per short ton at the beginning of 2023, decreased to \$259 per short ton in late June, and increased to \$625 per short ton in late October. The average ammonia price for 2023 was estimated to be about \$480 per short ton.

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A long period of generally stable and low natural gas prices in the United States 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 U.S. ammonia industry in the next 5 years is expected to increase capacity by about 2%, which includes decarbonized ammonia projects.

Global ammonia capacity is expected to increase by a total of 6% during the next 4 years. Capacity additions were expected in places with low-cost natural gas such as in central and eastern Asia, Eastern Europe, and North America. As part of the capacity increase, decarbonized ammonia plants have been proposed in several countries but mainly in North America. Consumption of ammonia for fertilizer is expected to increase by about 1% per year, depending on availability and cost, with the largest increases expected in Latin America and south Asia.

Large corn plantings maintain the continued demand for nitrogen fertilizers in the United States. According to the U.S. Department of Agriculture, U.S. corn growers planted 38.1 million hectares of corn in crop-year 2023 (July 1, 2022, through June 30, 2023), which was 6% more than the area planted in crop-year 2022. Corn acreage in crop-year 2024 is expected to increase because of anticipated higher returns for corn compared with those of other crops.

World Ammonia Production and Reserves:

| | Plant production | | Reserves ⁵ |
|-----------------------|------------------|-------------------|--|
| | 2022 | 2023 ^e | |
| United States | 13,800 | 14,000 | Available atmospheric nitrogen and sources of natural gas for production of ammonia were considered adequate for all listed countries. |
| Algeria | 2,600 | 2,600 | |
| Australia | 1,500 | 1,500 | |
| Canada | 3,410 | 3,400 | |
| China | 43,000 | 43,000 | |
| Egypt | 4,100 | 4,000 | |
| Germany | 1,460 | 1,500 | |
| India | 13,700 | 14,000 | |
| Indonesia | 6,000 | 6,000 | |
| Iran | 4,400 | 4,400 | |
| Malaysia | 1,400 | 1,400 | |
| Netherlands | 2,000 | 2,000 | |
| Nigeria | 1,600 | 1,600 | |
| Oman | 1,720 | 1,700 | |
| Pakistan | 3,400 | 3,400 | |
| Poland | 1,820 | 1,800 | |
| Qatar | 3,110 | 3,100 | |
| Russia | 14,000 | 14,000 | |
| Saudi Arabia | 4,000 | 4,000 | |
| Trinidad and Tobago | 3,710 | 3,700 | |
| Uzbekistan | 1,200 | 1,200 | |
| Vietnam | 1,180 | 1,200 | |
| Other countries | 13,700 | 14,000 | |
| World total (rounded) | 145,000 | 150,000 | |

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.