

NITROGEN (FIXED)—AMMONIA

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

Domestic Production and Use: Ammonia was produced by 15 companies at 26 plants in 16 States in the United States during 2005. Fifty-seven percent of total U.S. ammonia production capacity was centered in Louisiana, Oklahoma, and Texas because of their large reserves of natural gas, the dominant domestic feedstock. In 2005, U.S. producers operated at about 66% of their rated capacity. The United States remained the world's second largest ammonia producer and consumer following China. Urea, ammonium nitrate, ammonium phosphates, nitric acid, and ammonium sulfate were the major derivatives of ammonia in the United States, in descending order of importance.

Approximately 90% 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 plastics, synthetic fibers and resins, explosives, and numerous other chemical compounds.

| Salient Statistics—United States: ¹ | 2001 | 2002 | 2003 | 2004 | 2005^e |
|--|-------------|-------------|-------------|-------------|-------------------------|
| Production ² | 9,120 | 10,300 | 8,600 | 8,850 | 8,700 |
| Imports for consumption | 4,550 | 4,670 | 5,720 | 5,900 | 6,500 |
| Exports | 647 | 437 | 400 | 381 | 540 |
| Consumption, apparent | 13,200 | 14,500 | 14,000 | 14,300 | 14,700 |
| Stocks, producer, yearend | 261 | 286 | 197 | 274 | 175 |
| Price, dollars per ton, average, f.o.b. Gulf Coast ³ | 183 | 137 | 245 | 274 | 295 |
| Employment, plant, number ^e | 1,800 | 1,700 | 1,550 | 1,300 | 1,150 |
| Net import reliance ⁴ as a percentage of apparent consumption | 31 | 29 | 39 | 38 | 41 |

Recycling: None.

Import Sources (2001-04): Trinidad and Tobago, 53%; Canada, 17%; Russia, 16%; and other, 14%.

| Tariff: | Item | Number | Normal Trade Relations |
|----------------|--------------------|---------------|-------------------------------|
| | | | 12-31-05 |
| | 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: Although they did not significantly damage ammonia plants in the Gulf Coast area, Hurricanes Katrina and Rita disrupted natural gas supplies and led to increased prices for natural gas. Hurricane Katrina initially reduced natural gas supplies by an estimated 8.8 billion cubic feet per day because of shut-ins and direct damage. Hurricane Rita resulted in more than a dozen natural gas processing plants going offline because of either flooding, lack of supplies, an inability to move stored liquids, or safety precautions. Natural gas pipelines sustained significant damage, and the Sabine Pipeline, operator of the Henry Hub, implemented a force majeure.

In September, the U.S. Department of Energy, Energy Information Administration forecast that the Henry Hub natural gas price would average about \$9.00 per million cubic feet in 2005 and \$8.70 per million cubic feet in 2006. Henry Hub prices were expected to remain above \$12 per million cubic feet until peak winter demand was over. Although most of the leading ammonia-producing companies purchase natural gas under contract, sustained high natural gas prices could lead to more closures of U.S. ammonia plants.

The second largest ammonia producer mothballed its 454,000-ton-per-year Donaldsonville, LA, ammonia plant in May; the plant had last operated in December 2004 as a swing ammonia producer. Volatile natural gas prices were cited as the principal reason for the closure. The Donaldsonville site will operate solely as a distribution and storage terminal. The operator of the ammonia plant in Alaska closed 650,000 tons per year of capacity (about one-half of the total at the site). The company, which had been having difficulties securing a steady supply of natural gas, signed contracts with Cook Inlet natural gas producers that would allow it to operate at the reduced level through November 2006. Most of the plant's ammonia production is shipped to the Republic of Korea.

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Several North American companies announced that they would no longer produce or market agricultural-grade ammonium nitrate. Rising security concerns and costs associated with security regulations were cited as the principal reasons for the decisions.

Two ammonia plants outside the United States were closed in 2005—a 280,000-ton-per-year plant in Canada and a 386,000-ton-per-year plant in Indonesia. Companies announced plans to build ammonia plants, the largest of which were a 1.5-million-ton per year plant in Trinidad and Tobago, a 1.1-million-ton-per-year plant in Algeria due onstream in 2009, and a 1-million-ton-per-year plant in Qatar due onstream in 2010. Smaller capacity plants were announced in China, Trinidad and Tobago, and the United Arab Emirates; these plants were scheduled to be completed in 2007 and 2008.

According to long-term projections by the U.S. Department of Agriculture's Economic Research Service, projected plantings for the eight major field crops in the United States would increase slowly from 2005-14, and the crop mix was expected to shift to corn and away from soybeans. Domestic corn use was projected to grow throughout the period, particularly for feed use and ethanol. Feed use of corn would rise as the U.S. livestock sector grows in response to increases in domestic demand for and exports of beef, pork, and poultry. As incomes grow in the rest of the world, especially in developing economies, consumers would shift to more meat in their diets, which requires more feed grains for meat production. Significant increases are projected in corn use for ethanol production during the next several years, reflecting continued expansion of production capacity. State-level bans on methyl tertiary butyl ether as a fuel oxygenate have increased incentives for ethanol expansion in recent years, and high petroleum prices have led to additional support for ethanol use.

Nitrogen compounds also are an environmental concern. Overfertilization and the subsequent runoff of excess fertilizer may contribute to nitrogen accumulation in watersheds. Nitrogen in excess fertilizer runoff is suspected to be a cause of the hypoxic zone that takes place in the Gulf of Mexico during the summer. Scientists continue to study the effects of fertilization on the Nation's environmental health.

World Ammonia Production, Reserves, and Reserve Base:

| | Plant production | | Reserves and reserve base⁵ |
|-----------------------|-------------------------|-------------------------|---|
| | 2004 | 2005^e | |
| United States | 8,850 | 8,700 | Available atmospheric nitrogen and sources of natural gas for production of ammonia are considered adequate for all listed countries. |
| Canada | 4,110 | 3,900 | |
| China | 34,800 | 34,000 | |
| Egypt | 1,680 | 1,700 | |
| Germany | 2,740 | 2,800 | |
| India | 10,700 | 9,500 | |
| Indonesia | 4,120 | 4,400 | |
| Netherlands | 1,970 | 1,800 | |
| Pakistan | 2,360 | 2,100 | |
| Poland | 1,980 | 2,000 | |
| Russia | 9,800 | 9,800 | |
| Saudi Arabia | 1,730 | 1,900 | |
| Trinidad and Tobago | 3,880 | 4,200 | |
| Ukraine | 3,900 | 3,800 | |
| Other countries | <u>24,600</u> | <u>25,000</u> | |
| World total (rounded) | 117,000 | 115,000 | |

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 global nitrogen supply.

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

^eEstimated.

¹U.S. Department of Commerce (DOC) data unless otherwise noted.

²Annual and preliminary data as reported in Current Industrial Reports MQ325B (DOC).

³Source: Green Markets.

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

⁵[See Appendix C for definitions.](#)