

## 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 2006; 2 additional plants were idle for the entire year. Fifty-six 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 2006, U.S. producers operated at about 78% of their 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 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.

<b>Salient Statistics—United States:</b> <sup>1</sup>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006<sup>e</sup></b>
Production <sup>2</sup>	10,300	8,450	8,990	8,040	7,900
Imports for consumption	4,670	5,720	5,900	6,520	6,000
Exports	437	400	381	525	240
Consumption, apparent	14,500	13,900	14,400	14,100	13,600
Stocks, producer, yearend	286	195	298	197	250
Price, dollars per ton, average, f.o.b. Gulf Coast <sup>3</sup>	137	245	274	314	300
Employment, plant, number <sup>e</sup>	1,700	1,550	1,300	1,150	1,150
Net import reliance <sup>4</sup> as a percentage of apparent consumption	29	39	38	43	42

**Recycling:** None.

**Import Sources (2002-05):** Trinidad and Tobago, 54%; Canada, 17%; Russia, 13%; Ukraine, 7%; and other, 9%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12-31-06</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:** High natural gas prices fell significantly in 2006. At the beginning of 2006, the Henry Hub natural gas price was nearly \$10.00 per million British thermal units, falling to a low of \$4.00 per million British thermal units by the beginning of October before beginning an upward climb. The average Gulf Coast ammonia price also fell from \$360 per short ton to its low for the year of \$244 per short ton at the end of June before beginning to increase. The U.S. Department of Energy, Energy Information Administration, projected that Henry Hub natural gas spot prices would average \$7.30 per million British thermal units in 2007. Two bills that could increase U.S. natural gas supplies were introduced in 2006—H.R. 4761, the "Deep Ocean Energy and Resources Act," and S. 3711, the "Gulf of Mexico Energy Security Act." H.R. 4761 would allow the lifting of a 25-year-old moratorium on exploration for natural gas in waters within the jurisdiction of the United States. S. 3711 would expand natural gas exploration and drilling in the Gulf of Mexico by offering leases in these currently restricted areas.

In July, the U.S. energy producer that owns the 128,000-ton-per-year ammonia plant in Dumas, TX, decided to close this plant, nearly one-half of which had been idle since December 2001. The company was investigating converting the ammonia facility into a hydrogen plant for use by the company's nearby petroleum refinery. The energy producer, however, continued to operate a 3,200-kilometer ammonia pipeline through one of its subsidiaries. Production capacity at the Coffeyville, KS, ammonia plant was increased by about 10% to about 400,000 tons by midyear. Improvements to the petroleum refinery resulted in increased hydrogen production, which was converted to ammonia. The Coffeyville ammonia plant is the only plant in the United States that uses petroleum coke as a feedstock.

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To combat thefts of ammonia for methamphetamine production, researchers at Iowa State University introduced a calcium nitrate inhibitor that can be added to ammonia, which would decrease the effective yield from 42% to 2% in methamphetamine production. The calcium nitrate has been tested to be nontoxic and safe for food supplies, has no adverse effect on the environment or farm equipment, and reduces the purity of the methamphetamine.

Two ammonia plants outside the United States were opened in 2006—a 400,000-ton-per-year plant in Egypt and a 680,000-ton-per-year plant in Iran. Several companies announced plans to build new ammonia plants in Brazil, Egypt, India, and Venezuela, which, if completed on time, would add 3.2 million tons of annual capacity by the end of 2009.

According to 10-year projections by the U.S. Department of Agriculture, Economic Research Service, plantings for the eight major field crops in the United States will increase slowly from the 2005 level. Corn, soybeans, and wheat will account for about 87% of area planted for the eight major field crops. During the 10-year period, the crop mix is expected to shift to corn and away from soybeans. Corn used to produce ethanol in the United States was projected to more than double from the 2004-05 level by 2015-16. This increase reflects the Renewable Fuel Program of the Energy Policy Act of 2005, which requires that gasoline sold in the United States contain specified quantities of ethanol, increasing from 4.0 billion gallons in 2006 to 7.5 billion gallons by 2012. Increased feeding of distillers dried grains, a coproduct of dry mill ethanol production, would help meet growing livestock feed demand; feed use of corn would rise only slowly in the projections.

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 base <sup>5</sup>
	2005	2006 <sup>e</sup>	
United States	8,040	7,900	Available atmospheric nitrogen and sources of natural gas for production of ammonia are considered adequate for all listed countries.
Canada	4,000	3,700	
China	37,800	39,000	
Egypt	1,640	1,650	
Germany	2,700	2,300	
India	10,800	10,800	
Indonesia	4,400	4,400	
Netherlands	1,700	1,700	
Pakistan	2,110	2,100	
Poland	2,000	2,000	
Qatar	1,700	1,800	
Russia	10,000	10,000	
Saudi Arabia	1,780	1,800	
Trinidad and Tobago	4,200	5,200	
Ukraine	4,300	4,300	
Other countries	<u>23,700</u>	<u>23,700</u>	
World total (rounded)	121,000	122,000	

**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.

<sup>e</sup>Estimated.

<sup>1</sup>U.S. Department of Commerce (DOC) data unless otherwise noted.

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

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

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

<sup>5</sup>[See Appendix C for definitions.](#)