



# SUPPLY & DEMAND, ENERGY DRIVE GLOBAL FERTILIZER PRICES



The Fertilizer Institute  
Nourish. Replenish. Grow

## Fertilizer is a world market commodity *necessary for the production of* food, feed, fuel & fiber.

**F**ertilizer is a world market commodity, which means that supply and demand factors in major markets around the world impact the price U.S. farmers pay for fertilizer. Average prices paid by U.S. farmers for the major fertilizer nutrients reached the highest level on record in April 2008, 228 percent higher than the January 2000 level according to the U.S. Department of Agriculture.

Increased global demand for fertilizer has played a large part in placing upward pressure on fertilizer prices. Overall, world nitrogen demand grew by 11 percent, phosphate demand grew by 13 percent and potash demand grew by 17 percent from fiscal year 2001 to 2006. China, India and Brazil are the three largest contributors to the growth in world nutrient demand.

The quest for healthier lives and better diets in developing countries is the primary driving factor behind the increased global demand for fertilizer. People in China, India and Brazil are seeking more food—requiring more nutrients to replenish the soil.

### WORLD FERTILIZER DEMAND IMPACTS U.S. MARKET



DEMAND ↑ 11 PERCENT



#### NITROGEN (N)

*is a primary building block for all organisms. It is essential to making proteins, helps keep plants green and is a critical component of soil structure.*

COMES FROM THE AIR

DEMAND ↑ 13 PERCENT



#### PHOSPHORUS (P)

*is found in every living cell. Phosphorus is a component of DNA and it also plays vital roles in capturing light during photosynthesis, helping with seed germination, and helping plants use water efficiently. Plants also use phosphorus to help fight external stress and prevent disease.*

COMES FROM ANCIENT SEA LIFE

DEMAND ↑ 17 PERCENT



#### POTASSIUM (K)

*is essential to the workings of every living cell. It plays an important role in plant's water utilization and also helps regulate the rate of photosynthesis. Other aspects of plant health influenced by potassium include the growth of strong stalks, protection from extreme temperatures, and the ability to fight stress and pests such as weeds and insects.*

COMES FROM EVAPORATED OCEANS

# SUPPLY & DEMAND FACTORS

GLOBAL DEMAND FOR FERTILIZER HAS PLACED UPWARD PRESSURE ON FERTILIZER PRICES.

THE U.S. ETHANOL BOOM IS DRIVING FERTILIZER DEMAND HIGHER, THEREFORE PLACING UPWARD PRESSURE ON FERTILIZER PRICES.

INCREASED TRANSPORTATION COSTS TO MOVE FERTILIZER PRODUCTS IS FACTORING INTO INCREASED DELIVERED FERTILIZER PRICES.

THE VALUE OF THE U.S. DOLLAR HAS FALLEN SIGNIFICANTLY IN THE PAST FEW YEARS, INCREASING THE COST OF GOODS IMPORTED - INCLUDING FERTILIZER.

HIGH NATURAL GAS PRICES IN THE UNITED STATES CONTINUE TO LEAD TO HIGHER FERTILIZER PRODUCTION COSTS, ALSO LEADING TO INCREASED FERTILIZER PRICES.

## U.S. Ethanol Production is Increasing Domestic Fertilizer Demand.

CORN, WHEAT, SOYBEANS AND COTTON ACCOUNT FOR 70 PERCENT OF TOTAL U.S. NUTRIENT USE, WHILE CORN ALONE ACCOUNTS FOR 43 PERCENT.

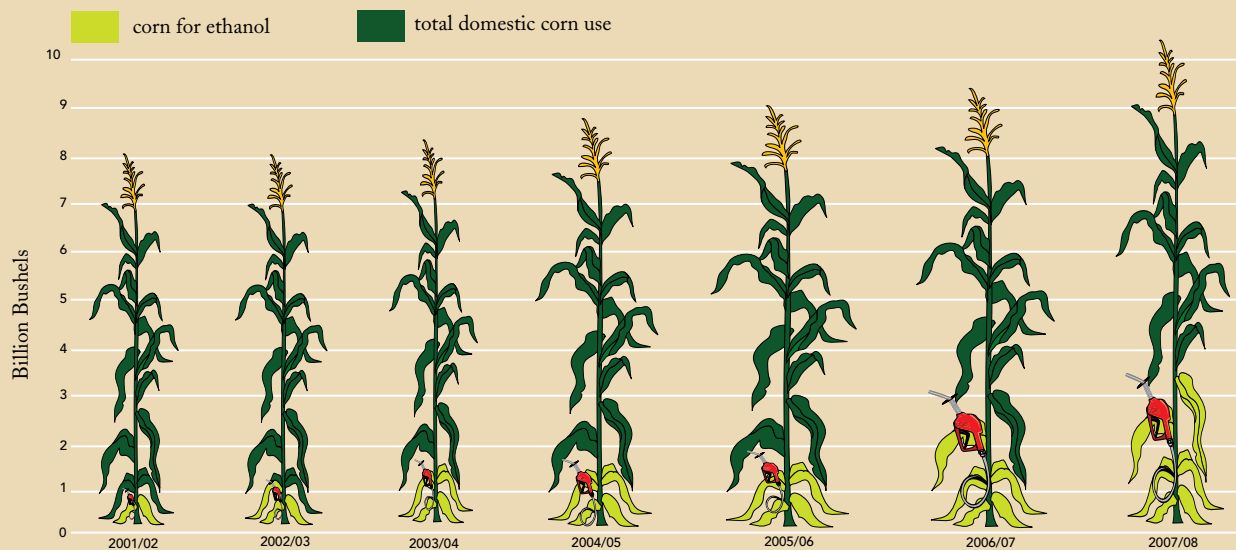
While world nutrient demand has risen significantly since fiscal year 2001, U.S. nutrient demand remained relatively flat, ranging from 20.7 to 23.4 million nutrient tons. Then came the ethanol boom. The annual capacity of the U.S. ethanol sector stood at 5.6 billion gallons in February 2007. Ethanol plants under construction or expansion are expected to add another 6.2 billion gallons of capacity. According to the U.S. Department of Agriculture, U.S. ethanol production could easily reach 11 billion gallons in 2011. Farmers are responding to higher corn prices resulting from the increase in demand by planting more

corn acres.

Farmers planted 93.6 million corn acres in 2007—a 19 percent increase from the 78.3 million acres planted in 2006 and the highest corn acres since 1944. The average annual corn price received by farmers stood at \$1.97 per bushel in 2005, \$2.28 in 2006 and \$3.39 in 2007—the highest annual average since 1996.

Changes in U.S. nutrient use are driven by two factors: changes in crop acres planted and changes in application rates. Strong international demand coupled with increased domestic demand will continue to place upward pressure on fertilizer prices.

## Ethanol Demand Drives Corn Crop



# Higher Transportation Costs Are Also Contributing to Higher Delivered Fertilizer Prices

FERTILIZER TRANSPORTATION COSTS BY ALL MODES – OCEAN FREIGHT, RAIL, BARGE AND TRUCK RATES ARE UP.

Higher energy prices, a significant demand for transportation and even weather related events, have caused shipping and distribution costs to rise. Shipping rate increases include all methods of fertilizer transportation—ocean freight, rail, barge and truck.

Ocean freight rates are up significantly. Continued strong demand for vessels, strong import demand for iron ore and coal, and exports of steel by China and higher fuel costs have been the primary drivers of higher ocean freight rates. Weather disturbances and port congestion have also contributed to higher ocean freight rates by tying up vessels and lengthening the shipping times.

The cost of shipping fertilizer by rail has increased significantly due to fuel costs, security requirements and

liability concerns.

Barge rates have risen primarily due to steep demand spurred by competition from other industries. Also factoring in are higher fuel costs and new, time-consuming and expensive security requirements.

Truck rates have been significantly impacted by the continued high cost of fuel.

Transportation providers have significantly higher capital costs such as fleet replacement and expansion. With much of the fertilizer applied in the United States having its origin beyond U.S. borders, it is not only possible, but likely, that the fertilizer applied on a field in Missouri has taken each of these transportation modes to arrive at the field. Thus, the combined transportation costs are significant.

## Fertilizer Transportation Costs are Up



**RAIL TANK CAR**

- Fuel costs
- Security requirements
- Liability



**TRUCK CARGO TANK**

- Fuel costs



**OCEAN VESSEL**

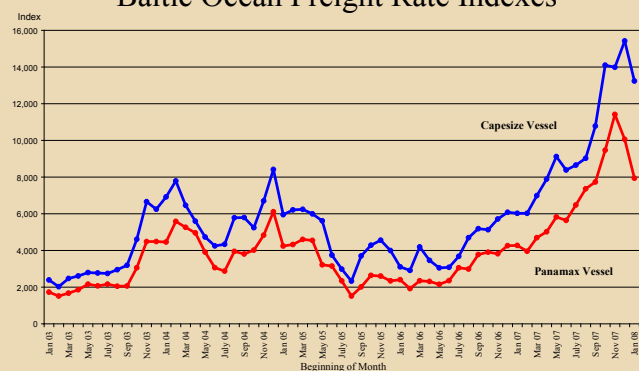
- Fuel costs
- Capacity
- Competition



**BARGE**

- Fuel costs
- Security requirements
- Competition

**Baltic Ocean Freight Rate Indexes**



While rates have receded from recent highs, the cost of ocean freight has risen significantly over the past five years. Since January 2003, Capesize vessel rates have increased 453 percent, while Panamax rates have increased 359 percent. Rates have increased primarily as a result of strong demand for vessels, strong import demand for iron ore and coal and exports of steel by China and higher fuel costs, but have also been impacted by factors such as port congestion and weather disturbances.

FERTILIZER PRICES, LIKE MOST OTHER COMMODITIES, ARE PRICED IN U.S. DOLLARS.

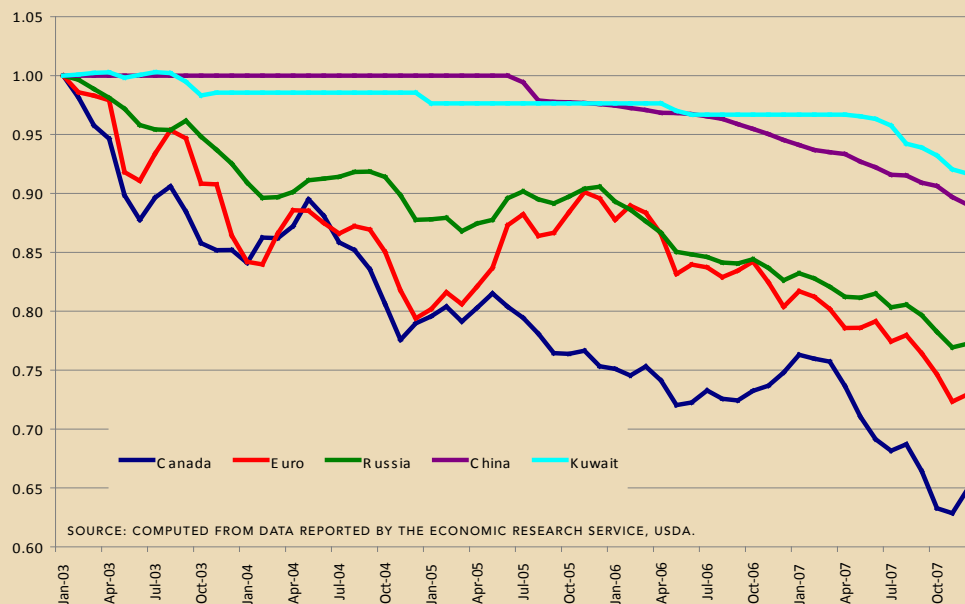
The value of the U.S. dollar has decreased significantly, increasing the cost of imported goods - including fertilizer.

The exchange rate allows for the conversion of one country's currency into that of another, thereby facilitating international trade and it allows price comparison of similar goods in different countries. The exchange rate is a significant factor influencing the competitiveness of commodities, including fertilizer. Simply put, a weak U.S. dollar increases the price of imported commodities.

The value of the U.S. dollar has fallen significantly in the past few years, increasing the costs of the goods we import. The United States now imports over half its nitrogen and over 90 percent of its potash. With most fertilizer materials priced in U.S. dollars, foreign producers have to raise the price of fertilizer in U.S.

dollars to offset the fall in the value of the dollar to maintain the revenue they receive in local currency. For example, if a fertilizer material is priced at \$300 per ton and the value of the U.S. dollar falls by 30 percent relative to the currency in the country where the material is produced, producers in that country will experience a 30 percent decline in local revenue, if all else remains equal. In order to maintain revenue in local currency, the price of the material in U.S. dollars has to be increased by 43 percent as follows. The new price in U.S. dollars, \$429, is equivalent to the revenue the foreign producer received in local currency (\$300) before the dollar declined since  $\$429 * 0.7 =$  the equivalent of \$300 in local currency.

## Value of U.S. Dollar Falls



SOURCE: COMPUTED FROM DATA REPORTED BY THE ECONOMIC RESEARCH SERVICE, USDA.

The value of the U.S. dollar from January 2003 through December 2007 has fallen significantly. As shown above, the U.S. dollar relative to other currencies has fallen: 35 percent against the Canadian dollar; 27 percent against the Euro; 23 percent against the Russian Ruble; 11 percent against the Chinese Yuan; and 8 percent against the Kuwait Dinar.

AVERAGE U.S. AMMONIA PRODUCTION COSTS HAVE RISEN 172 PERCENT SINCE 1999.

## U.S. farmers must compete with farmers from around the world for nitrogen, phosphate & potash.

The United States is the largest importer of nitrogen (over 50 percent of supply) and potash (over 90 percent of supply) and the largest exporter of phosphate.

Natural gas is the feedstock for producing ammonia, which is the building block for all nitrogen fertilizers. The cost of natural gas accounts for 70 to 90 percent of the production cost of ammonia. Thus, with U.S. natural gas prices increasing significantly since 2000, average U.S. ammonia production costs rose by 172 percent from fiscal year 1999 to fiscal year 2005.

While fertilizer prices have risen, many U.S. producers were faced with negative margins due to the severe escalation in production costs. High natural gas prices have caused 26 U.S. ammonia plants to close since fiscal year 1999. Several plants also remain idle.

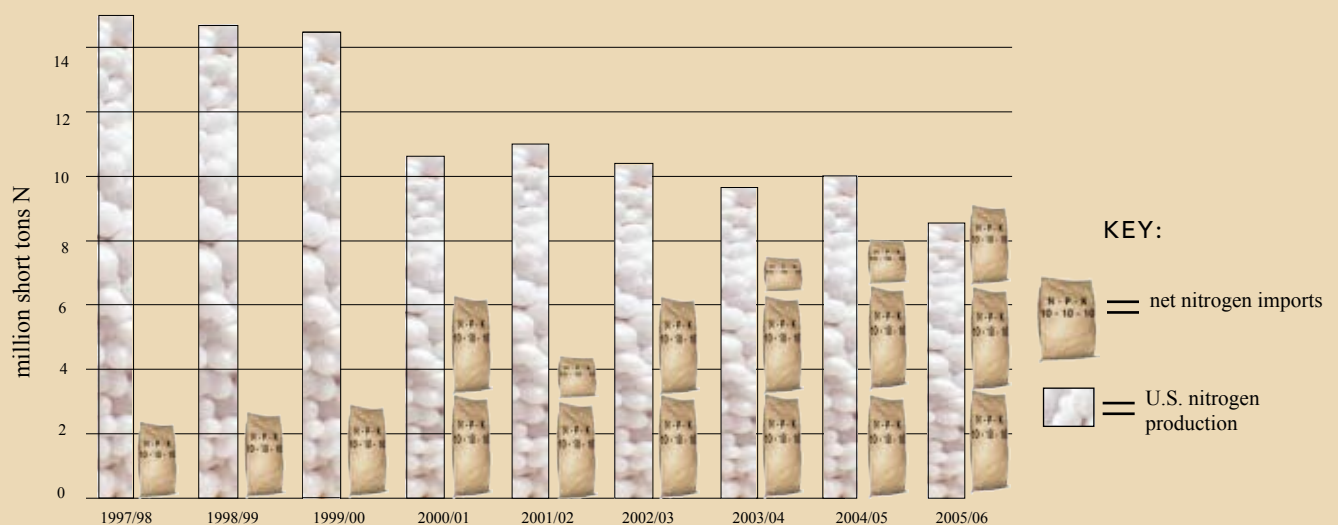
As a result of ammonia plant closures, U.S.

ammonia production fell by more than 42 percent since fiscal year 1999. Consequently, the U.S. fertilizer industry, which typically supplied 85 percent of farmers' domestic nitrogen needs from U.S. based production during the 1990s, now relies on net nitrogen imports for more than half of new nitrogen supplies.

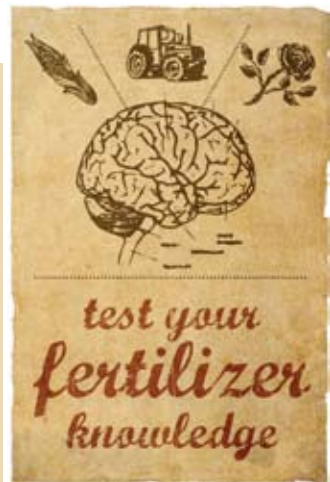
This situation also impacts phosphate fertilizer production, as average U.S. production costs for ammonium phosphates increased by 20 percent from 1999 to 2003. These costs are expected to show continued increases as ammonia prices have risen further.

After years of relative stability, North American potash prices increased significantly beginning in mid-July 2003. The bulk of the price increase realized has resulted from the 19 percent growth in global potash demand since fiscal year 2001.

### U.S. Nitrogen Production Decreases and Imports Rise



SOURCE: COMPUTED BY THE FERTILIZER INSTITUTE FROM DATA REPORTED BY THE U.S. DEPARTMENT OF COMMERCE



## 1 WHAT ARE THE TOP THREE FERTILIZER-UTILIZING DOMESTIC CROPS?

Corn, wheat and soybeans.

## 2 HOW MUCH FERTILIZER DOES IT TAKE TO PRODUCE A BUSHEL OF CORN, WHEAT OR SOYBEANS?

Depending on the type of cropping system used,  
corn: 1.5 to 2 pounds of fertilizer nutrients.  
wheat: 2.5 to 3.5 pounds of fertilizer nutrients.  
soybeans: 1.0 to 1.5 pounds of fertilizer nutrients.

## 3 WHY IS FERTILIZER IMPORTANT TO AGRICULTURE PRODUCTION?

Humans, animals and plants rely on a safe, healthy supply of food and nutrients like nitrogen (N), phosphorus (P) and potassium (K) for proper growth and development. Fertilizer is the 'food' that plants – from corn and wheat to pumpkins and apples – need to produce a healthy and bountiful crop. All crops require nutrients in one form or another.

## 4 WHAT ARE THE TOP THREE FERTILIZER-CONSUMING COUNTRIES IN THE WORLD?

China, India and the United States, respectively.

## 5 WHAT HAS HAPPENED TO DOMESTIC NITROGEN PRODUCTION?

High natural gas prices have caused 26 U.S. ammonia plants to close permanently since fiscal year 1999, and several additional plants are currently idle. As a result, U.S.

ammonia production fell by 6.2 million tons of nitrogen or by over 42 percent since fiscal year 1999. Consequently, the U.S. fertilizer industry which typically supplied 85 percent of farmers' domestic nitrogen needs from U.S. based production during the 1990s, now relies on net nitrogen imports for half of new nitrogen supplies.

## 6 WHY HAVE CORN ACRES INCREASED SO DRAMATICALLY?

In 2006, 78.3 million acres of corn were planted in the United States. In 2007, corn acres planted rose to 93.6 million acres. The U.S. Department of Agriculture (USDA) reported that domestic ethanol production accounted for 25 percent of total corn demand in 2007. For the first time, corn used in ethanol exceeded the amount of corn the United States exported. At the same time, the U.S. livestock industry is concerned about rising feed prices and reduced profitability, which are resulting from high corn demand. Increased acreages of corn will have to be planted in the United States in upcoming years in order to meet the demands of the rapidly expanding renewable fuels industry.

## 7 HOW DO FERTILIZER PRICES COMPARE TO OTHER FARM INPUT COSTS?

While fertilizer prices are up, the price increases realized are only slightly above those observed for most other major farm inputs. Despite the substantial increase in global fertilizer demand, the significant impact of rising natural gas costs, and the current expansion in U.S. nutrient demand resulting primarily from the expansion in ethanol production, average fertilizer prices in April 2008 stood at 244 percent higher than the 1990-92 level, according to USDA data. In comparison, the prices of seed, farm machinery and wage rates were up 86-175 percent, while fuel costs increased 269 percent over the same period.



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