



The Fertilizer Institute

Nourish, Replenish, Grow

Ethanol Production and Fertilizer Use May 2006

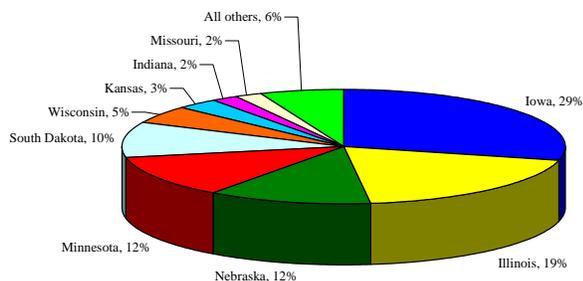
The ethanol industry is the fastest growing renewable energy industry in the world. In the United States last year, nearly 13 percent of the corn crop was used for ethanol production, representing the third largest market for U.S. corn behind only livestock feed and exports. Depending on the type of cropping system used, it typically takes 1.5 to 2 pounds of fertilizer nutrients to produce a bushel of corn. Last year, there were 11.1 billion bushels of corn produced. Of the estimated 9.5 million nutrient tons of fertilizer used to produce the 2005 corn crop, nearly 1.25 million nutrient tons were used to produce the corn used in ethanol production. The Fertilizer Institute (TFI) is pleased to provide the following situation analysis, including the potential impact of increased demand for ethanol on the fertilizer industry.

U.S. Ethanol Picture

Ethanol is blended in more than 30 percent of the gasoline sold in the United States today. In response to rising demand, U.S. ethanol production broke both monthly and annual production records last year. For the year 2005, 95 ethanol refineries located in 19 states produced a record 4 billion gallons, an increase of 17 percent from 2004 and 126 percent since 2001.

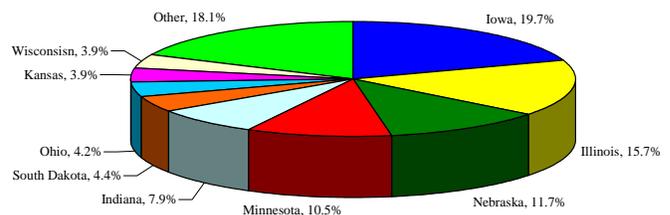
Fourteen new refineries were completed and brought online in 2005. These new refineries, combined with expansions at existing facilities, resulted in record annual capacity growth of 779

U.S. Ethanol Production Capacity by State



Source: Renewable Fuels Association, January 2006.

U.S. Corn Production by State - 2005



Source: USDA

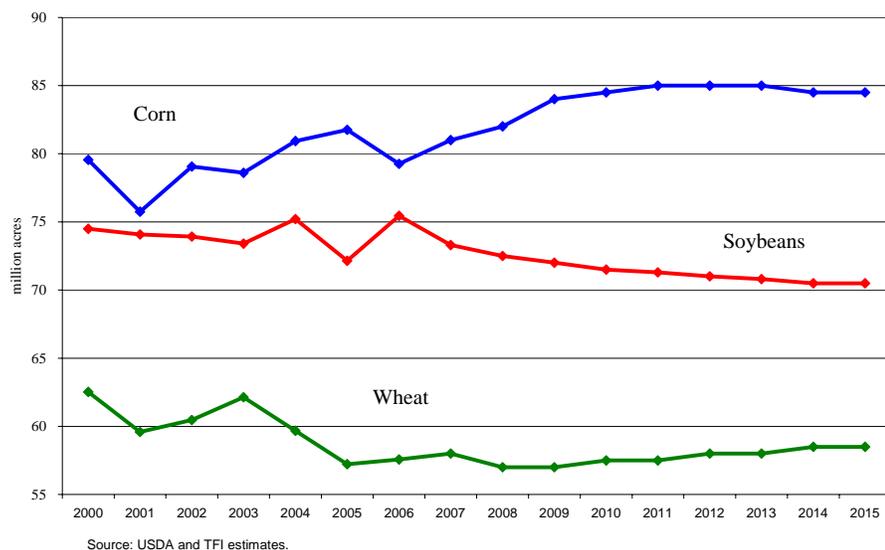
million gallons. At the end of 2005, 29 ethanol refineries and nine production plant expansions were under construction with a combined annual capacity of more than 1.5 billion gallons. Nebraska leads all states with nine ethanol plants being constructed or expanded, followed by Iowa with seven plants. The remaining plants being constructed or expanded are in the following states: Minnesota 3; Indiana 3; South Dakota 3; Michigan 3; Colorado 2; and Kentucky, Illinois, Missouri, California, Texas, North Dakota, Kansas and Wisconsin each have one.

Domestic Demand for Corn to Increase Over Time

The Renewable Fuel Program of Energy Policy Act of 2005 (EPACT) mandates renewable fuel use in gasoline to reach 7.5 billion gallons by calendar year 2012, nearly double the 2005 level. The Renewable Fuels Standard, as contained in EPACT, is set to have a significant impact on the U.S. economy by 2012 including \$70 billion in spending on goods and services required to produce 8 billion gallons of ethanol and biodiesel by 2012. Projected purchases of corn, grain sorghum, soybeans, corn stover, and wheat straw alone will total \$43 billion.

This program will have a significant impact on domestic ethanol production, which is primarily produced from corn. High energy prices also contribute to favorable returns for ethanol production, providing additional economic incentives for expansion of domestic ethanol production capacity. In USDA's

Chart 1: Planted Acreage of Corn and Soybeans



“Agricultural Baseline

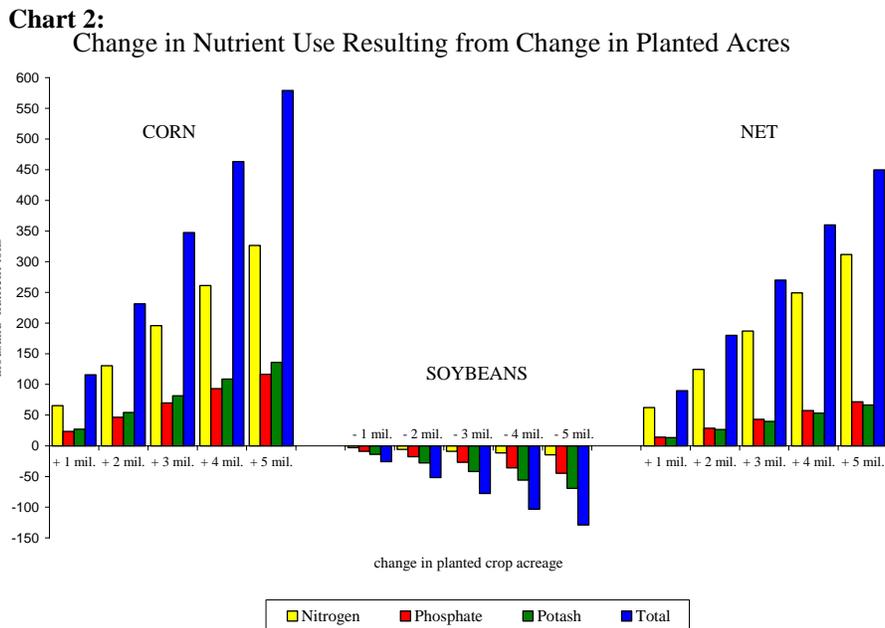
Projections to 2015,” corn acreage rises significantly in the initial years of the projections reaching 85 million acres by 2011 (Chart 1), as large domestic ethanol production from corn increases demand, raising corn prices and net returns. In the longer run, increasing exports also underlie higher corn acreage. USDA predicts that high energy-related production costs for corn, like fertilizer, are forecast to keep soybean plantings near 73.5 million acres in 2007. However, the longer run forecast is for soybean area to decline to the 70-71 million acre ranges in the latter part of the forecast period as more favorable returns to corn production draw land from soybeans. In contrast, wheat acreage is forecast to remain relatively flat, ranging from 57-58.5 million acres out to 2015.

According to the U.S. Department of Agriculture (USDA), ethanol production increases the price a farmer receives for corn by 25 to 50 cents per bushel, or as much as \$5.5 billion over the entire

U.S. corn crop. Additionally, USDA estimates that ethanol production reduced farm program costs by \$3.2 billion in 2004 by increasing the demand and price of corn.

Increased Corn Demand’s Potential Effect on Nutrient Consumption

The increased corn acreage over time will result in additional U.S. fertilizer nutrient demand. Some of this additional demand will be offset by the forecast decline in soybean acreage, but the net result on nutrient demand will be positive. Using 2003 nutrient application rate data (the latest data available from USDA for corn), an additional million corn acres would require 65.3 thousand



thousand nutrient tons of P_2O_5 and 27.2 thousand nutrient tons of K_2O (Chart 2). A million acre decline in soybean acres planted would result in a drop in nutrient use of 2.9 thousand tons for N, 9.0 thousand tons for P_2O_5 and 13.9 thousand tons for K_2O (based on 2004 nutrient application rate data for soybeans). Changes in actual U.S. crop acreage planted over time will depend on many interrelated factors including crop prices, crop yields, energy and other farm input prices and commodity programs. We can estimate the potential impact of the expansion in U.S. ethanol demand on the demand for fertilizer nutrients by looking at a specific acreage change scenario which may or may not materialize. Assuming a long-run increase of 5 million acres for corn and a decline of 5 million acres for soybeans, annual U.S. nutrient use will increase by nearly half a million tons – 312 thousand tons for N, 72 thousand tons for P_2O_5 and 67 thousand tons for K_2O . This translates into increases of 2.5 percent for N, 1.6 percent P_2O_5 and 1.3 percent for K_2O over the 22.15 million nutrient tons of fertilizer consumed in the United States in FY2004/05.

Global Ethanol Picture

The production of ethanol worldwide rose substantially in 2005, totaling more than 12 billion gallons. As concerns over greenhouse gas emissions grow and supplies of world oil are depleted, Europe and countries like China, India, Australia and some Southeast Asian nations are rapidly expanding their biofuels production and use.

Brazil has long been the world’s leader when it comes to fuel ethanol use. Brazil requires 25 percent ethanol blends be used and provides preferential tax treatment. In 2005 the top five ethanol producing countries were: United States—4,264 mil/gal; Brazil—4,227 mil/gal; China—

1,004 mill/gal; India–mil/gal; and France–240 mil/gal. While the vast majority of ethanol is consumed in the country in which it is produced, Brazil and other nations have found export opportunities in the United States, Japan, and other markets around the globe.

Like many countries, the United States places an ad valorem tariff on imported ethanol, equaling 2.5 percent of the product’s value. But the United States’ ad valorem tariff is lower than that of any other nation in the world.

Global Ethanol Tariffs

Country	Ethanol Import Tariff
United States	2.5 %
Brazil	20 %
Argentina	20 %
Thailand	30 %
India	186 %
Canada	19 cents per gallon
European Union	87 cents per gallon

To prevent U.S. tax dollars from further subsidizing foreign-produced ethanol, which has already received support from the country of origin, the U.S. also imposes a secondary tariff on imported ethanol to offset the value of the tax credit, which is available to refiners blending ethanol in the U.S. regardless of its origin. As evidenced by the history of ethanol imports into the U.S. the secondary tariff is not a barrier to market entry.

Energy Policy Act of 2005

The Energy Policy Act of 2005 contained several important policy initiatives designed to stimulate and encourage renewable fuel production. Renewable fuels include but are not limited to: ethanol (made from corn, sugar, sorghum etc.) biodiesel (primarily made form soybeans), and cellulose ethanol (made from grasses, straw, wood chips etc.). Relevant policy initiatives follow:

- Provides that every gallon of cellulose ethanol equals 2.5 gallons of renewable fuel;
- Requires that beginning in 2013, 250 million gallons of cellulose ethanol be used to meet the requirements of the Renewable Fuels Standard (RFS);
- Establishes a loan guarantee program of up to \$250 million per ethanol production facility (which can include cellulose ethanol production facilities) and a \$650 million grant program (subject to funding);
- Creates an Advanced Biofuels Technology Program at \$550 million (subject to funding).

Growth of Renewable Fuels

It is estimated that the United States could produce the equivalent of 7.9 million barrels of oil per day by 2050, more than 50 percent of our current total oil use for transportation. According to the Renewable Fuels Association, renewable fuels could:

- Virtually eliminate our demand for gasoline by 2050;

- Be cheaper than gasoline and diesel, saving about \$20 billion per year on fuel costs by 2050;
- Increase farmers' profits by more than \$5 billion per year by 2025.

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