

The Status of Grain-Based Ethanol Production in Kansas and Implications for the U.S. Biofuels Industry

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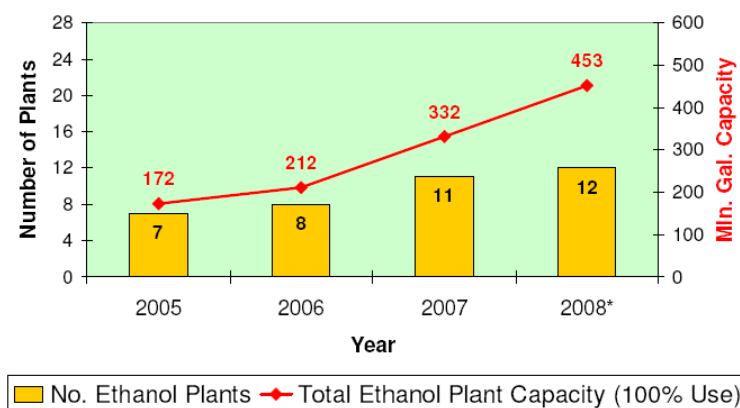
The current status and future prospects for the U.S. ethanol industry are topics of great interest to government leaders in states such as Kansas, Iowa and elsewhere. The future of the ethanol industry as well as other forms of energy were addressed in a formal hearing of the Kansas Legislature's Special Committee on Energy and Environmental Policy on Wednesday, August 20th. The focus of this hearing was to gather information on a range of energy-related issues, including broader trends in national energy resource supply and demand and instate natural gas supplies, as well as grain-based and cellulosic ethanol production.

Information summarized below about the current status and future prospects for ethanol industry in Kansas was presented at this hearing by K-State Extension Agricultural Economist Daniel O'Brien with assistance from Mike Woolverton. After a formal presentation, legislators responded with questions about the future of grain-based ethanol production.

I. Current Status of the Kansas Ethanol Industry

Capacity and Location: There were 12 operating grain-based ethanol plants in Kansas as of August 1, 2008. Growth in Kansas ethanol production since 2005 is shown in Figure 1. If these plants produced ethanol at 100% of their stated capacity, they could produce 453 million gallons of ethanol annually (MGY). Of these plants, 3 were located in Southwest Kansas (180 MGY), 2 in the South Central region (80 MGY), 2 in West Central Kansas (50 MGY, 11%), and 1 plant each in the Central (52 MGY), Northwest (40 MGY), and East Central (35 MGY) areas of the state. Two additional grain-ethanol plant facilities exist in the state – one under construction in Northwest Kansas (20 MGY) with plans to begin production later in 2008, and one in South Central Kansas (55 MGY) that is at least temporarily off-line. The construction of at least one other ethanol plant is being considered for the Southwest region of Kansas that could process both grain and cellulosic feedstock.

Figure 1. Growth in Kansas Ethanol Production: 2005-2008



Feed Grain Use: At the current annual production capacity of 453 million gallons of ethanol, the 12 operating grain-ethanol plants in Kansas would use approximately 162 million bushels of feed grains (corn and grain sorghum) per

year. This assumes that 1 bushel of feedgrains produces 2.8 gallons of ethanol. This amount of feedgrains equals 29% of the average total corn and grain sorghum production during the 2005-2007 period. Production from the ethanol plant under construction and the plant currently off-line would bring feed grain use to 188 million bushels, 33% of 2005-2007 average production.

Distillers Grain Production and Use: Since the fall of 2005, distillers grains (DGS) production by Kansas ethanol plants has supplied an increasing percentage of the maximum potential DGS use by Kansas livestock feeders. Using Kansas livestock on feed numbers and Iowa State University livestock feed ration recommendations for fed, beef and dairy cattle, poultry and hogs, it is estimated that during the September 1, 2005 – August 31, 2006 period Kansas ethanol plants produced 23% (1,085 million pounds) of the maximum amount of distillers grains that could be fed to Kansas livestock. This proportion increased to 28% during the 2006/07 period and 41% in 2007/08, and is projected at 55% in 2008/09.

Comparative Advantages for Kansas Ethanol: Grain ethanol plants located in Kansas may have some comparative advantages relative to other geographic regions of the country. With their proximity to major cattle feeding operations in the western part of the state, Kansas ethanol plants are able to sell a large proportion of their distillers grain by-products in wet cake form – thereby saving on natural gas based drying expenses. In addition, with the existence of ethanol blending capabilities in Wichita in South Central Kansas, ethanol plants in the state are able to transport approximately 50% of their denatured ethanol product by truck instead of by rail transportation. Rail transport generally is more expensive than truck movements for short hauls, but is less expensive for long-distance shipping. Because of their locations in the western Corn Belt, Kansas ethanol plants also have a geographic transportation cost advantage over plants located further east when shipping ethanol by rail to western states. Some portion of these advantages may be offset by generally higher corn costs than in states such as Iowa, Minnesota, and South Dakota.

Truck Transportation Impacts: Kansas ethanol plants have impacted the truck transportation industry in the state. Approximately 515 semi-truckloads of feed grains are needed daily to supply feedstock to Kansas ethanol plants. Assuming that 50% of ethanol produced in the state is transported by truck from ethanol plants, it is estimated that 75 truckloads of ethanol are shipped daily in Kansas. In addition, about 350 loads of wet distillers grains are hauled away from Kansas ethanol plants to livestock feeders on a daily basis. Converted to an annual basis, Kansas ethanol plants require 188,000 truckloads of feed grains, and transport out approximately 27,400 truckloads of ethanol and 128,000 truckloads of wet distillers grains. Trucking-related operating and capital expenses associated with Kansas ethanol plants amount to approximately \$54 million dollars per year (using 2007 diesel prices) (Source, Josh Roe, K-State, 2008).

II, Legislator's Questions Regarding Ethanol

Following is a discussion some of the questions raised by legislators in this hearing regarding the future of the Kansas ethanol industry. The answers provided in the hearing and additional discussion are shown below.

Question #1: What is the competitive position of Kansas ethanol plants – are they in a better or worse position to survive in the long run relative to those in other areas of the United States?

Answer: For the reasons stated above (i.e., lower cost of selling wet distillers grains, ability to truck 50% of ethanol produced, and geographic proximity and transportation cost advantages relative to fuel markets western United States), Kansas ethanol plants have some comparative competitive advantages relative to those in other parts of the U.S. Corn Belt. Also, the density of ethanol plant locations and cross-plant competition for limited feedgrain supplies are generally lower in Kansas than in other parts of the Corn Belt (such as in Iowa, Southern Minnesota, eastern South Dakota, central and eastern Nebraska, and Illinois). However, while there is less plant-to-plant competition among Kansas plants for feedstock supplies than in other parts of the United States, this advantage may be at least partially offset by a greater level of competition for these same feed grains from livestock feeders, especially in the western part of the state.

Question #2: Does the \$0.51 per gallon ethanol subsidy paid to ethanol blenders have any effect on the profitability of ethanol plants and on grain prices?

Answer: Credible economic research indicates that although the \$0.51 per gallon ethanol subsidy paid to blenders for using ethanol does not directly affect ethanol producers (ethanol producers or plants do not directly receive the

subsidy), it does have a positive indirect effect on ethanol prices received by ethanol producers. Because of the \$0.51 per gallon subsidy given to ethanol blenders, they are able to pay a higher price for ethanol than they otherwise would without the subsidy. The \$0.51 per gallon ethanol subsidy paid directly to blenders thus has an indirect positive effect on the price that ethanol plants can pay for corn to process into ethanol. The renewable fuels standard (RFS) and ethanol import tariff (\$0.54 per bushel) are other parts of U.S. ethanol support policy to consider in evaluating the impact of government actions on the industry.

Question #3: What are the prospects for cellulosic ethanol production in Kansas and elsewhere?

Answer: The production of cellulosic ethanol holds great promise and its future use is supported by current U.S. energy policy. However, more research and technical advances in a number of key areas will be needed before this industry becomes a major source of energy. Advances are needed in the agronomic aspects of biomass-feedstock production, in the logistics of harvesting, transporting, and storing of the biomass products, and in the technical efficiency of processes for converting biomass into ethanol at the plant level. Improvements in these areas will be needed before cellulosic ethanol production can become cost competitive with grain-based ethanol production. Substantial public and private resources are being invested in research to improve the competitive efficiency of cellulosic or biomass-based ethanol production processes, and we should not underestimate the potential for these research efforts to be successful. The future economic viability and timing of availability of cellulosic ethanol will be dependent on the progress made as a result of these research investments.

Question #4: Will grain-based ethanol production remain a profitable, viable industry in the future?

Answer: Yes – with qualifications. Grain-based ethanol production will continue to be economically viable in the future **IF** a number of key energy and grain market relationships and energy policy parameters do not dramatically change.

One key factor in the future profitability of grain-ethanol is the degree to which the World and U.S. supply-demand balance of petroleum remains tight and provides ongoing support for petroleum and gasoline prices. The relationship between energy market prices and feed grain prices is now and will continue to be a key determinant of the future profitability of grain-based ethanol.

A second key factor will be the future evolution of U.S. energy policy pertaining to grain and/or cellulosic ethanol. If the current framework of governmental support for grain-ethanol production remains unchanged (i.e., direct subsidies to blenders, renewable fuels standards, and import tariffs), positive support will continue to be provided for the U.S. ethanol production in the future. If the current tight supply – high price scenario for world energy markets, the relative relationship between petroleum and feed grain prices, and the current framework of support for ethanol by the U.S. government continues into the future, it is likely that U.S. ethanol plants in general and Kansas ethanol production in particular will continue to be profitable and viable economic enterprises in the foreseeable future.

Various domestic and international energy agencies expect the current tight supply-demand fundamentals and high prices in the World and U.S. energy markets to continue for the foreseeable future. The future energy policy environment in the U.S. may be more uncertain than the outlook for energy prices. Tight energy supplies and high energy prices may be expected to provide support for energy resource development-oriented governmental policies, which are likely to continue to include both grain and cellulosic ethanol production.

III. Implications for the Midwest as Well as Other Regions of the U.S.

Following are some final comments and observations from the authors of this article regarding the future of ethanol production in the United States.

Energy cost, availability, dependability of supplies, and impacts on the U.S. trade balance will continue to be very crucial issues for the U.S. in the years ahead. The current real cost of energy has reached unsustainable levels and has become a major drain on the nation's balance of trade and value of the U.S. dollar, as well as consumer budgets, transportation and processing costs, and other aspects of the economy. A continuation of the longer-term upward trend in percentage of the U.S. energy supply coming from imports has serious geo-political implications as well.

To deal with these issues, policy-makers almost certainly will continue to include renewable energy as part of a package of efforts to provide longer-term energy solutions. Cost and availability of corn will be important in determining the size of the corn-based ethanol industry regionally and nationally. Other factors such as proximity to intensive beef feedlots and dairy production, as well as closeness to large population centers that need ethanol will be important influences on regional industry size and profitability. While the industry is very likely to remain economically viable for the longer-term, profitability on average will be substantially lower than in the high-profit year 1997. The industry will expand to the point where the relationship between corn and ethanol prices makes further investment in new plants unprofitable. Limited periods of negative returns are likely as the industry reaches its upper limit on size and as development of marketing and distribution facilities lags behind production capacity. At the national level, feed grain-based ethanol production may expand to slightly exceed the current 15 billion gallons per year mandate in 2015 specified in the 2007 energy legislation.

A number of pilot cellulosic ethanol plants and one or two commercial-size plants are under construction or in the planning stage at this writing. Likely feedstocks include grasses, forest and urban wastes, corn cobs, straw, and other crop residues. As the biofuels industry expands, economics will determine how cropland is allocated among grains, oil crops, forages, pasture, and other uses. The need for changes in cropping patterns will have far-reaching impacts on research and extension needs as well as the crop production, input-supply, livestock production, and marketing sectors of agriculture.