

Some Thoughts on Making Ethanol From Corn in Pennsylvania
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The State of Pennsylvania is intent on producing renewable fuels in Pennsylvania and is supporting the building up to seven corn-ethanol plants in the Commonwealth. Among the sites being considered are Clearfield County, Westmoreland County, Wayne County, and Schuylkill County. I am convinced that using corn to make ethanol in Pennsylvania is a bad idea. There are several reasons, but the most important is that corn is very expensive in Pennsylvania, especially compared to where the ethanol industry in the United States is located. This will put any plant in Pennsylvania at a tremendous competitive disadvantage and probably doom it to failure.

According to the Renewable Fuels Association, in August 2007 there were 115 ethanol plants operating in the United States, with 79 more under construction. There are many more under consideration, perhaps twice this many. These numbers do not include any of the proposed Pennsylvania plants. Of the operating plants, 21 are east of Mississippi River and 10 east of Chicago. There is a very good reason for this. The price of corn in the United States varies with location, with the lowest prices traditionally in the Midwest along the North Dakota-Minnesota border and straight south. As you move east or west from this line, the price is higher as an inducement to ship the corn west to the many feedlots on the High Plains where there are a lot of cattle, but very little corn, or to the East and Southeast, where there are a lot of dairy, poultry, and swine compared to the local corn crop. The prices in Pennsylvania average about 30 to 50 cents per bushel higher than Chicago, with the prices in South Dakota averaging about the same amount less than Chicago. Any ethanol plant operating in Pennsylvania should expect to have a cost of corn at least 60 cents per bushel higher than their counterparts in South Dakota and more likely 80 cents to \$1.00 per bushel. Rail rates from Central Ohio to Southeastern Pennsylvania in mid-September 2007 were 60 cents per bushel. That same time the price of corn in Southcentral South Dakota was 40 cents cheaper than Chicago. The numbers vary across the year, but these

are typical values.

Pennsylvania is a corn deficit state. The animals in Pennsylvania consume at least 170 million bushels of corn as grain per year. Our production varies with the weather, so the size of our crop varies, but the average of 2005-07 was 116 million bushels, which means our average deficit is about 53 million bushels, or over 66,000 truckloads per year. In 2002, a drought year, the state required about 141,000 truckloads of out-of-state corn to feed our animals. This calculation does not include the corn flake factory or any other industrial users.

National corn use for fuel has grown from 1.3 billion bushels in the 2004-05 crop year to 2.2 billion bushels in the 2006-07 crop year, and is estimated to be 3.4 billion bushels in 2007-08 (USDA). In the fall of 2006, high gasoline prices and low corn prices meant very high profits by ethanol plants. However, by early 2007, the corn price had risen sharply and the gasoline price had fallen and the plants were barely breaking even. The reason is that the non-fuel users of corn have no alternative but to buy corn. Corn is the major feed grain in the United States, high-fructose corn syrup has only very expensive sugar as a substitute to sweeten soft drinks, corn flakes must be made from corn, and so on. Only ethanol has a good substitute, gasoline, and so if ethanol production continues to climb there is every reason to think that corn prices will be driven up to a level where it is not profitable to make ethanol from corn. Without the federal subsidy of 51 cents per gallon, in 2006 ethanol would not have been competitive as a fuel - even if the corn was purchased at South Dakota prices. The subsidy expires in 2010.

What determines the profitability of an ethanol plant?

The biggest determinants of the profitability of an ethanol plant are (1) the price of gasoline, (2) the price of corn (57% of costs in 2003, more now), (3) the price of distillers grains, (4) whether the plant can sell the distillers grains wet, (5) transportation costs, and (6) energy costs. Given that, how would a Pennsylvania ethanol plant compare on these measures to the locations of competing ethanol plants? With the price of gasoline, our prices are about average or below average. The price of corn is very high in Pennsylvania compared to western Corn Belt

locations. The price of distillers grains is high now, but more than one of these plants in Pennsylvania would drive this price down sharply since our livestock numbers are not great enough to use that much distillers grain. No plant in Pennsylvania will be able to sell a significant amount of distillers grains wet. The plants being discussed are not in the middle of our livestock industry and few of our farms are large. This product has a very short shelf life and can only be a portion of an animal's ration. A plant the size proposed in Clearfield County would require 300,000 dairy cows to consume the distillers grains. There are less than 600,000 head in Pennsylvania. Very few are near Clearfield County. The transportation cost for distillers grains will be a challenge. Only with energy costs is Pennsylvania competitive with locations farther west, and even that is not a foregone conclusion. Coal burning plants will have emission requirements that natural gas plants do not, increasing the cost of the plant.

It is no coincidence that most of the corn-ethanol plants are in the western Corn Belt. It is an area with the lowest corn prices in the nation and enough animals so that much of the distillers grains can be sold wet. Rather than ship the corn, only the alcohol is shipped, with the corn and distillers grains only having local movements. This opportunity is not available in Pennsylvania. Any plant located here will have a significant competitive disadvantage. I would never invest in a corn-ethanol plant in Pennsylvania. I don't think the math works.