

# How ethanol stacks up as a fuel source

LITITZ — Ethanol is cited in every conversation as the answer to at least part of the United States' energy problem.

There's no question that ethanol production can be efficient. An input of 100 BTUs of coal can yield 102 BTUs of ethanol.

That same 100 BTUs of coal would give only 32 BTUs of electrical energy or 50 BTUs of synthetic gasoline.

Ethanol can be produced on farm-sized stills. The by-product distillers dry grain has a sizable cash value which lately has ranged from \$140 to \$185 a ton.

But there are a number of problems associated with ethanol, too.

As a fuel it vaporizes over a relatively small range and therefore is not particularly good for cold weather starting.

Ethanol does not have the energy output of other fuels, either. It takes about 1.3 gallons of ethanol to equal the output of one gallon of gasoline.

While there is 10 percent more thermal efficiency with ethanol, that doesn't necessarily mean the product gives more miles per gallon in a vehicle.

And if the ethanol isn't coming to the end user as a 200 proof product, it is hardly worth the trouble to produce.

Jim Castagno, manager of energy planning for DeKalb, has divided the production of ethanol into five areas: milling of grain, saccharification or the turning of starch to sugar, fermentation, distillation, and handling of the byproduct.

Milling of the grain can be either wet or dry. Wet milling provides a greater range of products. Generally they are worth more on the market than the products of dry milling, but they also

require a greater capital investment.

Most of the big industrial firms, like A.E. Staley, which recently opened a major ethanol plant in Tennessee, use the wet milling process. But cost alone makes it an unviable alternative for the average farmer.

Dry milling is better suited to farm-sized stills.

Castagno says he believes a modern, highly efficient plant producing fuel-quality alcohol can show a small but positive energy balance, even including all the energy to grow the grain used in the still.

Depending on the use of the by-product distillers grains, the value of material produced will vary.

Livestock nutritionists say the distillers grains, which contain 28 or 29 percent protein, are as valuable as soybean meal which contains 44 percent protein.

In fact, about 1900 pounds of distillers grain, supplemented with a little urea and dry corn, is a substitute for a ton of soybean meal.

Unfortunately, the distillers grain is not as valuable for monogastric animals like pigs and chickens as it is for cattle.

A hog can get only about two-thirds the feed value from distillers grain that a cow can get. Lysine and other elements must be added to the feed.

About the maximum ration of distillers grain a cow can be fed is three pounds per animal per day. Even a small 50,000 gallon per year still would produce 137 gallons distillers grain per day.

To consume the feed by-product which would be produced would require about 310 head of cattle on feed

Castagno puts the net cost of producing ethanol at about \$1.32 a gallon. That includes 51 cents per gallon by-product value.

The cost would be \$1.83 per gallon if the distillers grain was not added into the sum.

Largest single expense, of course, is corn. With corn selling for \$2.90 a bushel, corn would represent \$1.16 per gallon in the ethanol.

There would be 11 cents in coal; 11 cents in electricity; 24 cents in labor; 15 cents in yeast and chemicals; three cents in taxes, insurance and bonding; and three cents in maintenance.

It the ethanol can be produced in a marketable form, which at present means an anhydrous 200 proof, it can be sold for \$1.80 a gallon.

This leaves a gross margin

that would provide an adequate, if not spectacular, return on investment.

The federal excise tax exemption is responsible for 40 cents per gallon of this selling price. In some states, notably Iowa, state tax exemptions are worth up to \$1 per gallon more.

Before ethanol will be in widespread use, several conversions would have to be made in the engine.

The jet area would have to be increased 67 percent for 200 proof operation. The compression ratio of the engine would have to be boosted to 12 to 1. Timing would have to be retarded and some rubber and plastic parts would have to be replaced.

Despite the changes, remember it will take 1.33 gallons of ethanol to perform

the work of one gallon of ethanol should cost no more than 90 cents per gallon.

Put another way, if There is an alternative: gasoline costs \$1.20 a gallon, (Turn to Page B3)

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