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# Economic Considerations for Potential Fuel Alcohol Producers or Investors

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## ECONOMIC CONSIDERATIONS FOR POTENTIAL FUEL ALCOHOL PRODUCERS OR INVESTORS

by
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Production of alcohol fuel based on agricultural crops appears likely to expand in the United States. The combination of increased prices for imported oil, expanded Federal alcohol production incentives, and continuation of both Federal and State exemptions on at least portions of gasohol road taxes makes production of fuel alcohol appear attractive to potential investors. U.S. production of ethanol for fuel stood at only about 80 million gallons per year in early 1980, with more than 50 million gallons coming from a single, large-scale plant. Some targets call for production of 2 billion gallons per year by the mid-1980s. This 25-fold increase would take ethanol from its current level of 1/10th of a percent to around 2 percent of total U.S. gasoline consumption.

In spite of the political and economic forces underlying expectations of expanded ethanol production, many questions about economic feasibility remain. Key among these questions is the economics of different-sized plants and the relative roles each size might play in whatever expansion does take place in ethanol production. For those individuals thinking about on-farm, cooperative, or corporate investment in large-, small-, or medium-size alcohol operations, several economic questions need to be addressed.

What will it cost to produce ethanol for fuel? The overriding question facing potential investors is that of cost per gallon of fuel. Estimates abound, though few are based on solid, first-hand research. Estimated costs, net of by-product credits, range from around $1 per gallon to more than $4 per gallon. Economies of scale and greater utilization of by-products appear to make per unit costs lower in large than in small plants. Small-scale operations probably need to be utilized close to their production capacity, handle the feed by-product in relatively wet form, and have very short shipping distances for both inputs and outputs to have prospects of being competitive with large plants. Research at South Dakota State University is currently focused on how to lower ethanol production costs in small-scale plants.

Are required inputs available at reasonable cost? The principal feedstock for ethanol production in South Dakota at present is corn, since most commercial applications of cellulose conversion are not yet economic. In putting a price on the corn feedstock, costs of production and market value must be realistically considered. Temporary or abnormally depressed corn prices can not be assumed over the 10-year life of a plant investment. Moreover, since alcohol plants will need to be fully utilized to have much chance of being economical, labor requirements and costs can not be treated lightly.

Can the alcohol fuel be utilized on the farm or marketed? For ethanol to be mixed with unleaded gasoline to form "gasohol", it must be nearly 200-proof (anhydrous, or water free). However, it appears that it will be very difficult for many small-scale plants to economically produce 200-proof alcohol with currently available technology. Thus owners of small plants need to find fuel substitution uses on their own farms or identify non-gasohol markets for alcohol of 192 or lower proof. A typical 500-

acre farm in South Dakota utilizes about 7,650 gallons of liquid fuel annually, including auto and pickup use for farming purposes. Suppose one-half of that existing fuel could be displaced with ethanol. Because of ethanol's lower BTU value, about 6,000 gallons of ethanol would be required annually. It is questionable whether a small-scale plant producing only that much ethanol annually can produce fuel that is cost-competitive with existing fuels--given current technology and fuel prices. This implies that even so-called "small-scale" plants will in most cases not be single-farm operations in terms of fuel utilization.

How well can the feed by-product be utilized? Large-scale alcohol plants produce animal feed by-products that go into conventional protein supplement markets in dried form. The carbon dioxide by-product of such plants is also marketed in some cases. Only the feed by-product is likely to have economic value in the case of small plants. Good use will have to be made of that feed by-product if the net cost of ethanol from small plants is to be at all competitive with other fuels. Moreover, because of high costs involved in drying, the by-product from small plants may have to be handled in fairly wet form. If passed through a centrifuge, the whole stillage coming off of a small-scale plant utilizing corn as the feedstock can be brought down to around 70% moisture. Preliminary analysis indicates that this semi-wet by-product has a protein feed supplement value of around $34 per ton in South Dakota at present--if fed on-site and if sufficient livestock are on hand to consume the feed shortly after production. The precise value will of course vary with the type of livestock being fed and other factors. The $34 per ton value implies a by-product credit to production costs of 38¢ per gallon of alcohol if 2.4 gallons of alcohol are produced for each bushel of corn.

What kind of financing can be arranged? Potential sources of fuel alcohol plant financing are too numerous to list here. Several sources of government financing have been established or expanded over the past year. Most recently, the "Energy Security Act" passed into law this summer provided for additional funding for alcohol and other renewable energy production facilities. These government funding mechanisms, in combination with various energy-related tax provisions, serve to lower private investment costs and increase after-tax returns from alcohol production above what they would otherwise be.



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