GRAIN ALCOHOL MOTOR FUEL SUBCOMMITTEE
of the
STANDING COMMITTEES ON ENVIRONMENTAL PRESERVATION

Report to the Legislative Council
and the Members of the
First Session of the Sixty-fifth General Assembly

F I N A L R E P O R T

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House Concurrent Resolution 133 introduced during the Second Session of the Sixty-fourth General Assembly proposed that the Legislative Council create a study committee to "conduct a study relating to the feasibility of the manufacture of grain alcohol motor fuel by Iowa industries, and to the development of state sponsored programs to support such manufacture". In response to this resolution, the Legislative Council authorized a joint subcommittee of the Standing Committees on Environmental Preservation. The Chairmen of the Senate and House Standing Committees on Environmental Preservation appointed the following legislative membership:

Senator Wayne D. Keith
Senator Cloyd E. Robinson
Senator George L. Shawver
Representative John H. Clark
Representative Dale M. Cochran
Representative Luvern W. Kehe

At the organizational meeting of the Subcommittee, Senator Shawver was elected Chairman, Representative Kehe was elected Vice Chairman, and Ms. Elizabeth O'Connor of the House Chief Clerk's staff was named as Secretary.

As of December 13, 1972, the Subcommittee has held four meetings. In the course of these meetings, testimony has been heard from the following persons:

Myron Brower, Grain Processing Corporation, Muscatine, Iowa
Woodrow Diehl, Iowa Corn Growers Association
Solon A. Ewing, Agriculture and Home Economics, Experiment Station, Iowa State University
Walter Goeppinger, National Corn Growers Association
Jerry Hall, Mechanical Engineering, Iowa State University
Ken Langer, Farm Bureau Federation of Iowa
Wayne Laufenberg, Rural Policy Council Coordinator, Office for Planning and Programming
Dwight Miller, Northern Regional Research Laboratory, Peoria, Illinois
Gary Shults, Nebraska Agricultural Products Industrial Utilization Subcommittee
Harold Swanson, Iowa Western Community College

The Subcommittee became aware that a grain alcohol motor fuel blend is feasible to produce and use and that this blend offers environmental and economic advantages to Iowans. However, the Subcommittee also became aware that the high production costs involved make grain alcohol motor fuel blend uncompetitive unless

the production costs are lowered by state support or unless petroleum shortages cause the price of regular gasoline to rise. Because the recommendations of the members of the Subcommittee are based on their understanding of the production, utilization, benefits, and marketability of a grain alcohol motor fuel blend, a more complete discussion of these topics is given below.

PRODUCTION

The grain alcohol blend that the Subcommittee considered is a one to ten mixture of two hundred proof anhydrous corn alcohol and 90 octane lead free low aromatic gasoline. The process of producing the corn alcohol is similar to that used by distillers that make one hundred ninety proof alcohol for human consumption except that a final drying process is required. At the present time, there are no companies in the Midwest that make two hundred proof anhydrous alcohol, that is, industrial alcohol, from grain. Most industrial alcohol is made synthetically at a lower cost, from petroleum.

Production costs for industrial grain alcohol have been estimated by Mr. Cloud Cray, President of Midwest Solvents, Atchison, Kansas, and Mr. Dwight Miller, Assistant Director, USDA Northwestern Regional Research Laboratories. According to their estimates a distillery of a minimum size would be one that processes about ten thousand to fifteen thousand bushels of corn per day. This size plant costs around $7,500,000 to $10,000,000, including the special anhydrous tower. The tower itself is estimated to cost around $250,000 to $350,000. It could be added to an existing distillery in two to three years. One bushel of corn makes 2.5 to 2.7 gallons of alcohol, which means that one gallon of alcohol can be made from .37 to .4 bushels of corn. When corn is $1.00 a bushel, the cost of making one gallon of alcohol is between 57 cents and 60 cents. This figure is computed by adding the cost of corn to the conversion cost of 20.5 cents. This assumes a high protein feed by-product credit of 20.4 cents, that is 6.8 pounds of by-product feed per gallon of alcohol selling at $60.00 a ton. The amount of power used in a distillation plant would be somewhat under 11,000,000 m.c.f., one m.c.f. equaling 1,000,000 btu's.

UTILIZATION

Grain alcohol has been used regularly as a motor fuel additive in Europe and in American race cars since at least the 1930's. Successful tests for highway vehicles using grain alcohol were made in Iowa in the 1930's, but at that time the high cost of production and the relatively low cost of gasoline made the use of grain alcohol economically unfeasible. At present utilization tests are being made by the Nebraska Agricultural Products Industrial Utilization Committee. In 1971 this Committee tested a one to ten grain alcohol motor fuel blend in five 1971 state-owned motor vehicles. The tests showed that with this blend ratio no new carburetor ajustment was required. The tests also indicated that the exhaust emissions were very similar to those of lead free gasoline, that the octane raising tendency was negligible after the

octane reached 92, that alcohol kept the engine somewhat cleaner, and that the cleaner engine caused valve seat recession. This latter problem was apparently caused because the 1971 engines needed a leaded gasoline to run properly. However, when the Environmental Preservation Association requires that lead be phased out of gasoline and the engines are changed accordingly, this problem is expected to disappear. It is estimated that lead in gasoline will be outlawed by 1975. The Nebraska Committee, in cooperation with the University of Nebraska, is now planning to make on-the-road tests with 50 to 60 state automobiles.

BENEFITS TO THE ENVIRONMENT

The Committee was told that the use of grain alcohol in a motor fuel would benefit the environment by conserving a nonrenewal resource, that is, petroleum. Representatives of the petroleum industry pointed out that at the present time the demand for petroleum is increasing while the supply, at least the supply in the United States, is being depleted. Iowa in 1971 used 1,500,000,000 gallons of gasoline. The United States in 1971 used 90,000,000,000 gallons made from 200,000,000,000 gallons of crude oil. The new exhaust emission devices are expected to bring about a six percent increase in gasoline consumption. Petroleum industrialists claim that gasoline reserves are being depleted, and offer as evidence of this the attempt by oilmen to find new supplies and to use new sources such as Alaska and Russia, the lowering of import restrictions on oil, and the difficulty of independent oil dealers in finding surpluses that they can buy and sell at lower prices at "cut-rate" gasoline stations. The petroleum industrialists claim that the rising price of gasoline is a result of this shortage. It appears that the use of a ten percent additive of grain alcohol, made from a renewable resource, would save billions of gallons of gasoline, a nonrenewable resource. In 1971, in the United States, it would have saved 9,000,000,000 gallons.

It was suggested to the Subcommittee that an alcohol additive would benefit the environment by allowing the use of a catalytic converter. The catalytic converter has been suggested by the major automobile producers as being a means to satisfy the 1975 federal exhaust emissions standards. These converters, usually made of a precious metal like platinum, use the heat of the engine to convert pollutants to carbon dioxide and water. These converters, however, are poisoned within three months by the anti-knock, high octane lead additive that most gasolines contain. Since grain alcohol also has anti-knock octane increasing properties, it was suggested that alcohol would be in demand as an additive. However, it was discovered that a higher octane, nonleaded gasoline such as those already on the market, could be substituted for the leaded gasoline, and at a lower price than a grain alcohol blend. It also became clear that most American cars do not have adequate engine compartment space for the converter. The motor companies have suggested that this problem could be solved by the use of a smaller rotary engine such as the Wankel. The use of a rotary engine, however, eliminates the need for either

an alcohol or a high octane blend of gasoline, since it uses low octane gasoline.

BENEFITS TO THE IOWA ECONOMY

It was suggested to the Subcommittee that the manufacture and sale of a corn alcohol additive would benefit the farm as well as the industrial economy of Iowa. If all the gasoline used in Iowa in 1971, one and one-half billion gallons, used a ten percent alcohol additive, there would have been an additional market in Iowa for 60,000,000 bushels of corn, one bushel making 2.5 gallons of alcohol. This would appear to provide a small but definite increase in the price of corn. It is estimated that a one percent drop in the supply of corn yields a two percent increase in the price. In 1971, the United States produced around 5.1 billion bushels of corn. Thus, the price increase would be about 2 cents a bushel. This increase would be greater if surrounding states developed a grain alcohol program. Nebraska has already developed a rather extensive grain alcohol program and both Wyoming and Kansas have indicated an interest in developing such a program. Because an increase in the demand for corn could mean a decrease in the need for the federal farm program, the state of Nebraska has authorized its Department of Economics of the University of Nebraska to do a study on the effect of eliminating the federal farm program. The results of this study are not yet available.

The members of the Subcommittee were told that the manufacture of grain alcohol provides a high protein feed by-product, similar to soybean meal. At present, Iowa produces about 19,649 tons of this feed, about one-third of which is sold to foreign markets. The United States produces about 450,000 tons per year. However, the market for this by-product is apparently not stable. According to Dr. Wisner, an Iowa State University Agricultural Economist, a one percent increase in the supply of the protein by-product results in a three to four percent decrease in the price. A greater percentage price decrease results when the supply continues to increase. The price is now about $50 to $60 per ton. Distillers believe that the sale of the by-product is essential to the financial success of the grain alcohol industry. Because of this and because of the sensitivity of the market for the by-product, alcohol producers such as Cloud Cray and Myron Brower of Muscatine Grain Processing of Muscatine, Iowa, have been somewhat skeptical about the wisdom of building and operating a large number of new alcohol plants. If enough plants were built in Iowa to produce the 150,000,000 gallons of alcohol needed for a ten percent additive to all the gasoline sold in Iowa in one year, 60,000,000 bushels of corn would be needed, and about 450,000 tons of distillers feed would be produced (one bushel of corn yields 15 to 19 pounds of feed). This would be an increase of 2200 percent for Iowa in the amount of distillers feed produced and a national increase of 100 percent. Distillers say that this would lower the price of the feed and make alcohol production uneconomical. Mr. R. Ross of the USDA Economic Resources Service, Washington, D.C., has suggested, however, that a large amount of high protein feed could be absorbed if distributed nationally since the United States is

now experiencing a protein shortage. It has also been suggested that the distillers grains could be converted to and sold as food for human consumption, thereby increasing the demand and perhaps the price.

It was suggested to the Subcommittee that the industrial development of Iowa would be benefited if alcohol plants could be encouraged to locate in Iowa. According to Dr. Miller 525 fermentation plants, each processing 20,000 bushels of corn per day, built with a capital investment of $13,333,000 each, would have to be built to produce enough alcohol to supply the ten percent additive for the nation. Gary Shults of Continental Oil Company estimates that Nebraska would need about six plants built at a cost of about five to seven billion dollars each to supply the ten percent additive for the nation. At the present time there are no industries in Iowa that manufacture industrial grain alcohol, though alcohol is produced by Clinton Corn Products and Muscatine Grain Processing.

MARKETABILITY AND GOVERNMENT SUPPORTS

Testimony to the Subcommittee by representatives of the petroleum industry has indicated that a grain alcohol motor fuel blend is of little interest to consumers because of its high price. When grain alcohol sells at 65 cents per gallon and is blended in a one to ten ratio with gasoline, gasoline is 5 cents to 6 cents per gallon higher in price then regular leaded gasoline, and about 4 cents to 5 cents per gallon higher than regular unleaded gasoline. According to Gary Shults of Continental Oil Company, the petroleum companies are interested in using a grain alcohol additive to supplement diminishing petroleum reserves, but only if it can be produced and sold at a lower price.

At the present time there is no midwestern company that produces two hundred proof grain alcohol. The Nebraska Grain Alcohol Committee is using for their tests an alcohol made from paper by the Georgia-Pacific lumber company of Washington. Muscatine Grain Processing has stated that it is unlikely that any company will be interested in such production unless there is a reasonable guarantee of a market.

Both Kansas and Nebraska have confronted and attempted to solve the problem of the uneconomical nature of a grain alcohol motor fuel. The state of Kansas, in 1970, passed a concurrent resolution asking Congress to provide for a study of the grain alcohol additive. Some hearings were held, but no other action was taken. In 1971, Nebraska bill 776, later amended by bill 1208, provided for a grain alcohol fuel tax fund with an appropriation of $40,000 plus one-eighth cent per gallon of the farm tax refund to be used to establish and analyze procedures and processes for the manufacture and market of grain alcohol fuels. This bill also provided for a three cent per gallon tax allowance on a motor fuel with a ten percent grain based ethyl alcohol additive. This allowance begins in 1973 and is to last until sales of gasoline with an alcohol additive reach ten million gallons per year. The

Agricultural Products Industrial Utilization Committee was established to administer the funds. Members of this Committee have worked closely with the Grain Alcohol Motor Fuel Subcommittee.

RECOMMENDATIONS

After considering the testimony presented, the members of the Subcommittee have concluded that a grain alcohol motor fuel program has a certain potential, and that a study of it should continue. However, they also concluded that no major state support, such as that given by Nebraska, should be provided until it becomes clear whether or not there is to be a petroleum shortage, and until the automobile companies decide the means by which they will comply with the 1975 exhaust emission standards.

In order to assure that the study of a grain alcohol motor fuel will continue, the Subcommittee has asked the Legislative Service Bureau to draft two legislative documents. The first provides that a department of grain resources research be established within the Iowa Development Commission for the purpose of pursuing the development of an Iowa grain alcohol industry. The second, a concurrent resolution, urges that Congress include in any major energy study, a study of grain alcohol as an energy resource.

Drafts of the bill and resolution are attached to this report. The Subcommittee is to consider these drafts at a meeting on December 14.

Passed House, Date_____ Passed Senate, Date_____

Vote: Ayes_____ Nays_____ Vote: Ayes_____ Nays_____

Approved_____

A BILL FOR

An Act creating a division of grain resources research within the Iowa development commission.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF IOWA:

Section 1. NEW SECTION. GRAIN RESOURCES RESEARCH DIVISION ESTABLISHED. There is established within the Iowa development commission a division the purpose of which shall be to pursue the development of an Iowa grain alcohol motor fuel industry and its related products. This division, to be known as the division of grain resources research, shall cooperate with other administrative divisions established by the commission and may call upon these divisions and coordinate their functions for the development of the grain alcohol motor fuel industry.

Sec. 2. Section twenty-eight point four (28.4), Code 1973, is amended to read as follows:

28.4 COMMISSION EMPLOYEES. The commission shall be empowered to employ such assistants, clerks, and stenographers as its business may require. All said employees shall be paid from the funds hereinafter appropriated to the commission. The director, subject to approval by the governor, may employ administrative assistants or deputies, and shall employ administrative assistants or deputies for the division of grain resources research.

Sec. 3. Section twenty-eight point seven (28.7), subsection one (1), Code 1973, is amended to read as follows:

1. Collect and assemble, or cause to have collected and assembled, all pertinent information available regarding the industrial and agricultural and recreational opportunities and possibilities of the state of Iowa, including raw materials and products that may be produced therefrom; power and water resources; transportation facilities; available markets; the availability of labor; the banking and financing facilities; the availability of industrial sites; and the advantages of the state as a whole, and the particular sections thereof, as industrial locations; the development of a grain alcohol motor fuel industry and its related products; and such other fields of research and study as the commission may deem necessary. Such information, as far as possible, shall

consider both the encouragement of new industrial enterprises in the state and the expansion of industries now existing within the state, and allied fields to such industries.

EXPLANATION

This bill provides that a division of grain resources research be established within the Iowa Development Commission for the purpose of pursuing the development of an Iowa grain alcohol motor fuel industry. The bill further provides for cooperation between this division and the administrative divisions of the Commission.

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Senate Concurrent
Resolution by Sub-
committee on Grain
Alcohol Motor Fuel.

WHEREAS, the reserves of nonrenewable energy resources are being depleted; and

WHEREAS, the Congress of the United States is making studies of the depletion of these energy resources and of means by which to supplement and substitute for them; and

WHEREAS, the use of grain alcohol as a motor fuel additive provides a renewable source of energy; and

WHEREAS, studies have been made in certain midwestern states on the utilization of grain alcohol as an energy source, NOW THEREFORE,

BE IT RESOLVED BY THE SENATE, THE HOUSE OF REPRESENTATIVES CONCURRING, That the General Assembly of the State of Iowa respectfully petitions the Congress of the United States to include in any major energy resource study, a study of grain alcohol as an energy resource; and

BE IT FURTHER RESOLVED, That copies of this resolution be transmitted to the presiding officers of both houses of the United States Congress, to the chairmen of the agricultural committees of both houses of Congress, and to each member of the Iowa delegation to the Congress of the United States.