

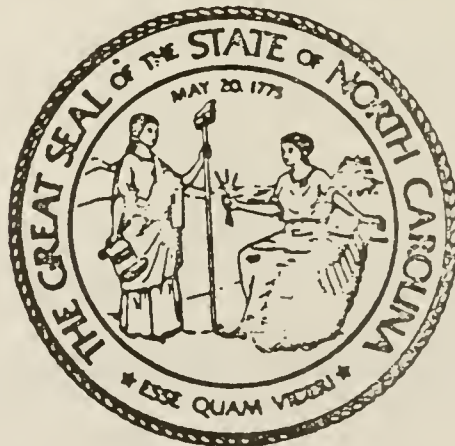
**LEGISLATIVE
RESEARCH COMMISSION**

REPORT

TO THE

1979

**GENERAL ASSEMBLY OF NORTH CAROLINA
SECOND SESSION, 1980**



**GASOHOL PRODUCTION
AND DISTRIBUTION**

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LEGISLATIVE RESEARCH COMMISSION
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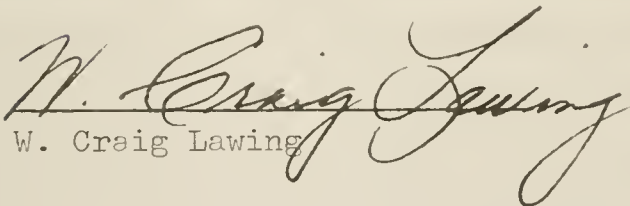
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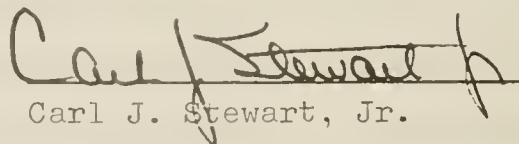
TO THE MEMBERS OF THE 1979 GENERAL ASSEMBLY
SECOND SESSION, 1980

The Legislative Research Commission herewith reports to the 1979 General Assembly of North Carolina, Second Session, 1980 on the matter of the Production and Distribution of Gasohol. The report is made pursuant to Resolution 64 of the 1979 Session Laws.

This report was prepared by the Legislative Research Commission Committee on the Production and Distribution of Gasohol, and it is transmitted by the Legislative Research Commission to the members of the 1979 General Assembly, Second Session, 1980, for their consideration.

Respectfully submitted,


W. Craig Lawing


Carl J. Stewart, Jr.

Cochairmen

LEGISLATIVE RESEARCH COMMISSION

LEGISLATIVE RESEARCH COMMISSION

MEMBERSHIP

1979-1981

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Cochairman

Senate President Pro Tempore
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PREFACE

The Legislative Research Commission, authorized by Article 6B of Chapter 120 of the General Statutes, is a general purpose study group. The Commission is Cochaired by the Speaker of the House and the President Pro Tempore of the Senate and has five additional members appointed from each house of the General Assembly. Among the Commission's duties is that of making or causing to be made, upon the direction of the General Assembly, "such studies of and investigations into governmental agencies and institutions and matters of public policy as will aid the General Assembly in performing its duties in the most efficient and effective manner" (G.S. 120-30.17(1)).

At the direction of the 1979 General Assembly, the Legislative Research Commission has undertaken studies of numerous subjects. These studies were grouped into broad categories and each member of the Commission was given responsibility for one category of studies. The Cochairmen of the Legislative Research Commission, under the authority of General Statutes 120-30.10(b) and (c), appointed committees consisting of members of the General Assembly and of the public to conduct the studies. Cochairmen, one from each house of the General Assembly, were designated for each committee.

The study of the production and distribution of gasohol in North Carolina was authorized by Resolution 64 of the 1979 General Assembly. The Commission was authorized in its study to:

- (1) review the current research on gasohol and how it relates specifically to North Carolina;
- (2) assess the existing technology to determine its potential for use in North Carolina;
- (3) perform an economic evaluation of raw material availability, marketability, and long-run supplies;
- (4) investigate and evaluate the alternatives to encourage the production, marketing, and distribution of gasohol; and
- (5) make recommendations to the General Assembly concerning appropriate actions or further needs relative to producing and distributing fuel substitutes for gasoline from agricultural and forest products grown in North Carolina.

The Legislative Research Commission grouped this study in its Energy Area under the direction of Representative Jack Hunt. The Cochairmen of the study committee set up by the Research Commission were Senator James B. Garrison and Representative Vernon G. James. The full membership of the Committee is listed in Appendix A to this report. Resolution 64 authorizing the study is attached as Appendix B.

COMMITTEE PROCEEDINGS

INTRODUCTION

The Legislative Research Commission's Committee to Study the Production and Distribution of Gasohol met five times. At the organizational meeting on October 25, 1979, the Committee decided that its first objective should be to learn as much as possible about alcohol fuels. Pursuant to that decision the second meeting was devoted fully to hearing speakers on every aspect of alcohol fuel production and distribution. At later meetings the Committee heard still more witnesses talk about various alcohol fuel issues.

A list of witnesses before the Committee is not included with the report, but the Committee wishes especially to thank representatives of the Energy Division of the Department of Commerce, the Department of Agriculture, the Department of Revenue, North Carolina State University, and all other public and private organizations who appeared before the Committee.

After having heard these speakers, the Committee devoted its last three meetings to deciding what action it should take to encourage the production and distribution of gasohol and other alcohol fuels. Four bills are recommended to the General Assembly.

This report is divided into two main parts. The first, which follows this introduction, reports the evidence which was presented to the Committee by the speakers. The second de-

scribes the recommendations of the Committee.

USE OF ALCOHOL AS A MOTOR FUEL

The Committee focused on ethanol as a motor fuel. In so doing, it recognized that ethanol is only a short-term solution to the energy crisis. Even if this country went to a massive ethanol-from-grain program, oil imports would be decreased by only about five percent. Ultimately the answer may be with methanol, a low cost fuel which can be produced from coal, wood, farm residues, or municipal solid wastes by catalytic conversion. But methanol is a fuel of the future. Setting up a methanol production plant requires a much larger investment than setting up an ethanol distillery. Questions also exist as to whether methanol production is economically feasible in the immediate future. Further, significant alterations in motor vehicle engines would be required before methanol could be used on any wide range.

The Committee decided instead to look at what impact alcohol fuels could have immediately. Ethanol mixed with gasoline in a ratio of 1 to 9 will run in motor vehicles without the need for any engine modifications. The use of this mixture, commonly called gasohol, raises several issues which the Committee examined.

The 1 to 9 ratio is not magical. A motor vehicle will run just as easily, for example, on ninety-two percent gasoline and eight percent ethanol, or eighty-eight percent gasoline and twelve percent ethanol. However, Congress has exempted from the federal four-cent motor fuels excise tax all gasoline which is mixed with alcohol if the mixture is at least ten percent alcohol.

(P.L. 95-618, 92 Stat. 3185.) The 1 to 9 ratio best takes advantage of this tax break.

Gasohol is currently marketed as a mixture of ethanol and unleaded regular gasoline. Ethanol will mix with other gasolines, but mixing it with unleaded regular yields an unleaded "super regular" which is not otherwise available.

Several small studies on mileage have been done with varying results. Since a gallon of gasohol contains 3.28 percent fewer BTU's than gasoline, if all other factors were equal a car would get 3.28 percent fewer miles per gallon. However, some studies using older cars with "rich" fuel-air mixtures have shown improved mileage using gasohol. Other studies have shown newer cars with "leaner" fuel-air mixtures get decreased mileage. No definitive performance studies have yet been reported.

Ethanol is an octane enhancer. Gasohol has a pump octane level of about two octane numbers higher than regular unleaded gasoline. This advantage gives gasohol its "super regular" characteristic, being between regular unleaded and premium unleaded in octane rating.

One disadvantage of gasohol is the requirement that the ethanol used in the mixture be anhydrous. Use of ethanol containing water can result in phase separation at hot and cold temperatures. The North Carolina Department of Agriculture now requires that ethanol used in gasohol offered for sale in this state be anhydrous.

Performance of motor vehicles using gasohol has been good. Gasohol has a higher compression ratio than gasoline which increases the thermal efficiency of the engine. Major car manufacturers have

extended their warranties to cover new cars using gasohol.

Evidence on pollution caused by cars running on gasohol has shown positive and negative aspects. Hydrocarbon and carbon monoxide emissions decrease but aldehyde and evaporative emissions slightly increase.

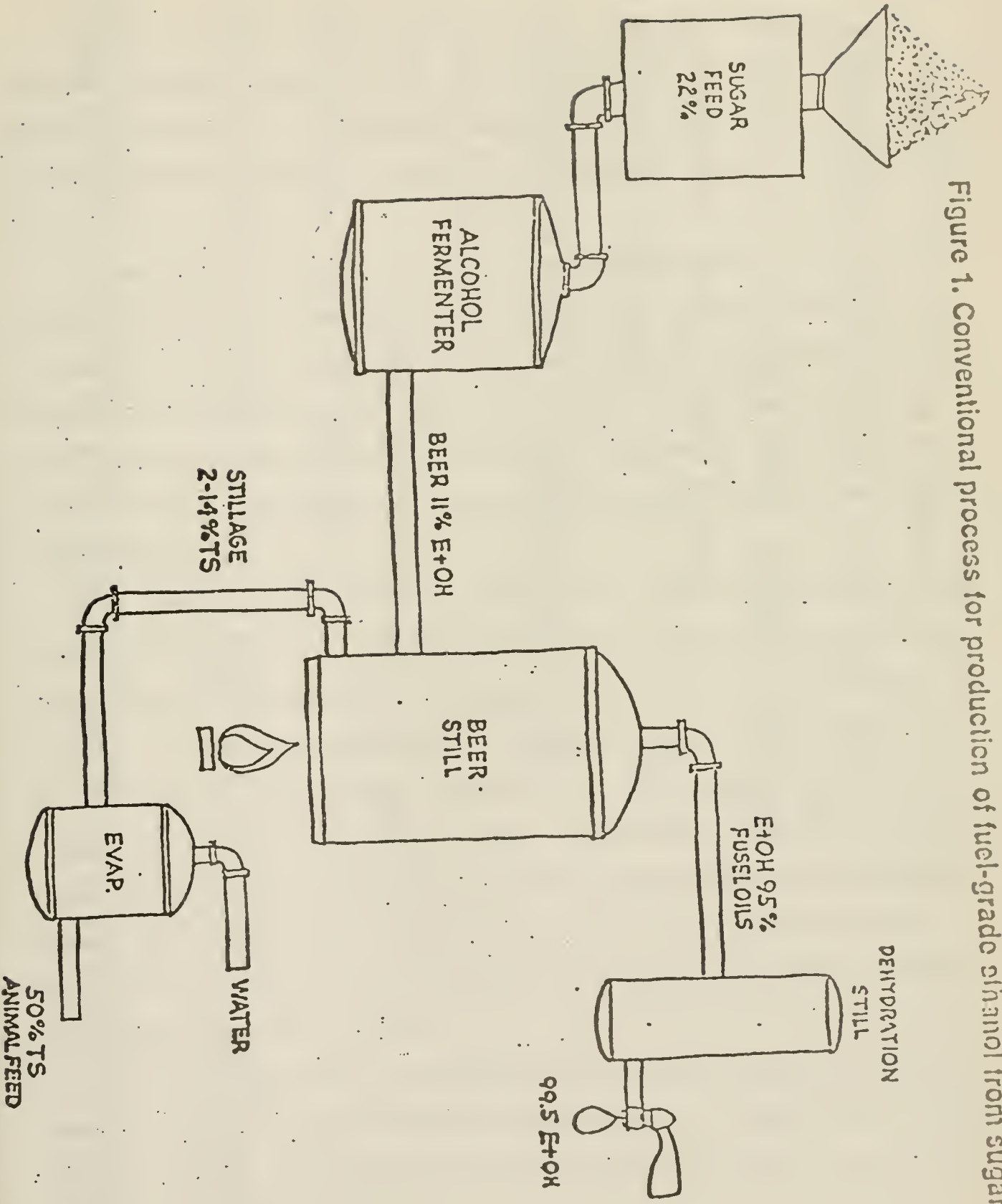
Motor vehicles will run on ethanol alone. The ethanol need not be anhydrous but may be as low as 140 to 150 proof. However, engine modifications are necessary to widen the jet openings in the carburetor and replace all plastic parts which could come in contact with the fuel. The modifications can cost as little as \$200-\$400.

While running a farm vehicle on straight ethanol may be feasible for a farmer who has a small still, running an automobile on straight ethanol has several disadvantages. The supply of ethanol is so limited that a person would have difficulty finding enough fuel for everyday driving. This situation is unlikely to change in the immediate future. Second, once the engine modifications necessary to run on straight ethanol have been made, the car will not run on gasoline or gasohol. For the car to run on either of those fuels, the modifications would have to be reversed.

PRODUCTION OF FUEL ALCOHOL

Figures 1 and 2 explain the distillation process that produces anhydrous ethanol. While the chemical process itself is well established, several issues involving production of fuel alcohol were debated before the Committee.

Figure 1. Conventional process for production of fuel-grade ethanol from sugars.



TYPICAL STEPS IN ETHANOL PRODUCTION

- 1) RECEIVING/WEIGHING/STORAGE OF RAW MATERIALS
- 2) GRINDING OR CRUSHING
- 3) COOKING - CONVERSION OF STARCH
- 4) COOLING
- 5) ADDING YEAST - TRANSFER TO
- 6) FERMENTATION
- 7) PRIMARY DISTILLATION
- 8) REMOVAL & DRYING SPENT MASH
- 9) TERNARY DISTILLATION TO 200°
- 10) DENATURING, STORAGE, SHIPPING

Federal licensing of distilleries is through the Bureau of Alcohol, Tobacco, and Firearms under the Treasury Department. The type of license a distiller needs depends upon such factors as his plant capacity and whether he plans to operate commercially or not.

Presently North Carolina has no regulatory power over fuel alcohol distillers, and a distiller needs no state permit or license. The State Board of Alcoholic Control requested that the Committee recommend to the General Assembly that the Board have some power to regulate fuel distillers. The Board cited the possibility of violation of state ABC laws and federal laws and regulations.

The economic feasibility of small and large scale distilleries was the subject of diverse opinions. The primary costs of ethanol production are the cost of the feedstock, labor and fuel, and the cost of the physical plant. A credit against those costs can be taken for the sale of byproducts. In terms of capital outlay for a still, the figure most frequently quoted by witnesses before the Committee was one dollar for each gallon of anhydrous alcohol the still could produce each year, i.e., a distillery capable of producing 50,000 gallons of anhydrous ethanol per year would cost \$50,000 to build.

The main byproducts of ethanol distillation from agricultural products are distiller's dried grains (DDG's). These have a high protein content, especially if the feedstock was corn, and can be used as a feed for livestock.

If anhydrous ethanol is not being made, a final dehydration step is not required. Elimination of this final distillation saves money, but witnesses before the Committee differed over how much. Some persons said a distillery capable of producing 200 proof ethanol (and therefore capable of doing the final distillation) must be large, producing at least one million gallons per year. Others maintained small-scale stills could economically produce anhydrous ethanol.

Witnesses also debated the economic feasibility of small-scale distilleries designed to produce less than 200 proof ethanol. Often cited was the fear that many stills currently being marketed are of poor quality. Witnesses complained that no one offers a still with a guarantee.

One reason for this debate over economic feasibility is that the industry is so new. Few distilleries exist nationwide from which to gather data. None in North Carolina has been operating long enough for any reliable results to be available. The Committee did not reach any conclusions on this question, but decided to allow the market to determine economic feasibility.

The question of net energy balance, i.e., whether more energy is used in producing ethanol than is in the final product of the distillation, was raised by several witnesses. Different studies have reached different conclusions on the issue, and experts differ on the net energy balance of identical stills. The major issue seems to be what components of the system should be included in the calculations. The energy used to power the still and the

energy contained in the ethanol are most often considered. Most formulas also include the energy used to harvest the crop used as raw material and take a credit for the energy saved by use of the DDG's. But experts debate whether or not the energy used to plant and care for the crop should be included, if credit should be taken for the solar energy "in" the crop, or if several other possible components should be included.

Generally petroleum powered stills, especially ones originally built for beverage production, show a net energy loss no matter what components are considered. But as technology improves and stills are built specifically for fuel alcohol distillation, especially if powered by coal or wood chips, the chances of finding a positive energy balance increase.

Several witnesses pointed out that perhaps a more important point about the whole issue does not involve net energy balance at all. Conversion of coal to electricity results in a major energy loss, but a low quality energy source is converted to a high quality one. By the same token, a distillery powered by a low quality energy source such as wood chips or coal produces a high quality motor fuel.

Ethanol's impact on oil use in this country in the next decade was addressed by several witnesses. Most agreed that if grain were the sole feedstock for production of ethanol, even a massive, nationwide commitment to ethanol production would not reduce oil imports over five percent. A more likely projection over the next five years, those witnesses agreed, is a reduction of imports by less than one percent, due in part to the scarcity

of stills currently operating or planned. However, as technology develops so that ethanol can be economically produced from non-grain products, the impact on imports should be greater.

AVAILABILITY OF RESOURCES FOR ETHANOL PRODUCTION

Several persons spoke to the Committee on resources available in this state for production of ethanol. Ethanol can be distilled from any agricultural or forestry product containing either starch or sugar.

Forest products such as woodchips are presently not an economical feedstock for ethanol production. Wood energy in the form of wood stoves, boilers, or other devices is an alternative in itself to oil.

Agricultural products including sweet potatoes, Irish potatoes, sugar beets, sorghum, and cereal grains (e.g., corn, grain sorghum, wheat, oats, and barley) are possible feedstocks for ethanol distillation. Whether or not that use would be economically feasible would depend on several factors including: (a) the supply/demand situation of the markets; (b) the proximity of the product to the alcohol processing plant; (c) the cost of fuel and other energy inputs to convert the product to alcohol; (d) the selling price of the finished product (or its value to the producer in his operations) and how this compares with current rates for petroleum fuels; and (e) the demand for protein-rich byproducts for livestock feed.

The cost of actually converting from raw material to ethanol ranges from forty to sixty cents per gallon. The main variable

relating to cost of production is the cost of the raw material. Two key considerations relating to this cost are the starch or sugar content of the crop and its yield per acre. These two elements may be altered by concentrated breeding. If a farmer wants to produce a crop for ethanol production rather than for food, several growing practices can be implemented to increase both starch or sugar content and yield. A memorandum discussing North Carolina agricultural feedstocks for ethanol is attached as Appendix C.

TAX CONSIDERATIONS

Gasohol is taxed as a motor fuel under G.S. 105-434. Several witnesses before the Committee stated that a full or partial exemption from this tax for gasohol is needed for it to be price competitive with gasoline. Ethanol presently sells for around \$1.75 per gallon wholesale in this state (part of that cost being transportation to ship the ethanol here from Pennsylvania or Indiana, the two closest distillers). With gasoline prices running well below that figure, gasohol cannot compete now without some type of tax incentive.

The federal government has completely exempted gasohol from its four-cent motor fuels excise tax. Several witnesses, including representatives of The North Carolina Energy Division and The North Carolina Farm Bureau Association, urged the Committee to recommend a partial exemption from the state road tax as well. Fifteen states have granted gasohol some exemption from their fuel taxes. Other proposals made to the Committee included a property tax break on property used in the production of fuel alcohol, an

income tax exemption for income derived from fuel alcohol production, and an investment tax credit for building a fuel alcohol distillery. A summary of state tax incentives for gasohol is included as Appendix D, and a table showing the experiences of several states granting incentives is included as Appendix E.

RECOMMENDATIONS

The Committee found that alcohol fuels could make an impact on energy use and that production and distribution should be encouraged. In light of that decision, four bills are recommended to the 1980 session of the General Assembly. The bills are included in Appendix F of this report. Following are the recommendations of the Committee, including explanations of the bills:

1. The Committee recommends an investment tax credit for construction of fuel ethanol distilleries. (LEGISLATIVE PROPOSAL #1.)

This bill gives any corporation or individual that constructs in this state a distillery to make ethanol from agricultural or forestry products for use as a motor fuel an investment tax credit against income tax. The credit is twenty percent (20%) for all those distillers, and an additional ten percent (10%) if the distillery is primarily powered by use of an "alternative fuel source." That term is defined in the bill as including agricultural and forestry products, waste petroleum products, and peat, and specifically excluding all other petroleum products, coal and natural gas. The definition is drafted as "including" rather than "meaning" certain sources so that the list is not exclusive. Other similar fuel sources, such as solar energy, would also be covered.

The Committee believed that most distillers would not immediately start making a profit. Therefore, the credit carries a five-year carry-over provision.

Other conditions of the credit parallel those of two recent acts of the General Assembly. A credit for construction of cogenerating power plants was enacted in the 1979 session, and a credit for conversion of an industrial boiler to wood fuel was enacted during the same session. These statutes were used as guides for drafting this proposal.

The effective date of the recommended bill is January 1, 1980. Therefore, anyone who has invested in the construction of a distillery during the calendar year 1980 can receive the credit on his 1981 tax return.

A fiscal note on this bill follows the bill in Appendix F.

2. The Committee recommends a partial exemption from the motor fuels and special fuels tax for gasohol and a full exemption from that tax for use of non-anhydrous ethanol as a motor fuel.

(LEGISLATIVE PROPOSAL #2)

This bill gives tax incentives to alcohol fuels for the period January 1, 1981, through June 30, 1984. The exemption for gasohol is phased out over the period. The exemption is four cents for the period January 1, 1981, through June 30, 1981. Then the exemption is three cents for fiscal year 1981-82, two cents for fiscal year 1982-83, and one cent for fiscal year 1983-84.

The bill includes a refund section so that if a person has to pay the full nine-cent tax, he can recover the amount of the exemption.

The bill also fully exempts non-anhydrous ethanol used as a motor fuel. The purpose of this full exemption is to allow an individual to distill ethanol in his own still and use it in his car or truck without having to pay any tax on it. The Committee thought that to require such an individual to pay the gasoline tax on this ethanol would discourage small-scale stills. Any ethanol sold or distributed is not covered by this exemption.

A fiscal note on this bill follows the bill in Appendix F. Pursuant to request of the Governor's Blue Ribbon Study Commission on Transportation Needs and Financing, no increase in the gasoline tax is recommended to cover projected lost revenue. (See Appendix G.)

3. The Committee recommends a \$175,000 appropriation for alcohol fuels research. (LEGISLATIVE PROPOSAL #3)

This bill appropriates \$175,000 for research at North Carolina State University. The research would involve energy conservation and substitution of alternate fuels and energy sources in crop production and livestock housing. In addition a demonstration still would be built and operated to produce alcohol for use in vehicles and/or farm power units located on one of the University Research Farms in the Raleigh area.

4. The Committee recommends that this Study Committee con-

tinue and that the subject of its study change from "gasohol"
to "alcohol fuels." (LEGISLATIVE PROPOSAL #4.)

This resolution authorizes the Legislative Research Commission to continue this study, but changes the name of the committee from a "gasohol committee" to an "alcohol fuels committee." The Committee believes many issues need further study. For example, the Committee has thus far concentrated on ethanol and has not looked carefully at methanol, another fuel alcohol.

APPENDICES

LEGISLATIVE RESEARCH COMMISSION

Committee on

GASOHOL PRODUCTION AND DISTRIBUTION

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Representative Vernon James, Route 1, Box 264 Elizabeth City, North Carolina 27909	<u>Cochairman</u>	919-330-4394
Representative David W. Bumgardner, Jr. P. O. Box 904 Belmont, North Carolina 28012		704-825-5301
Mr. Hank Finch Finch Oil Company 809 South King Street Fayetteville, North Carolina 28301		919-483-4101
Senator Cecil R. Jenkins, Jr. Post Office Box 65 Kannapolis, North Carolina 28081		704-933-2189
Senator I. Beverly Lake, Jr. Post Office Box 1306 Raleigh, North Carolina 27602.		919-828-1135
Representative Timothy H. McDowell Route 6, Box 96 Mebane, North Carolina 27302		919-584-9711
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Mr. Allen C. Ward Route 1, Box 127-A Shallotte, North Carolina 28459		919-287-6405
Senator Robert W. Wynne Post Office Box 12195 Raleigh, North Carolina 27605		919-755-1480

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 1979
RATIFIED BILL

RESOLUTION 64

HOUSE JOINT RESOLUTION 1143

A JOINT RESOLUTION TO AUTHORITY THE LEGISLATIVE RESEARCH COMMISSION TO STUDY THE POTENTIAL PRODUCTION AND USE OF GASOHOL IN NORTH CAROLINA.

Whereas, the United States is faced with a significant decline in the availability of dependable sources of oil; and

Whereas, the cost of available oil is increasing rapidly and promises to continue to increase in the future; and

Whereas, this increase has made alternative fuels more feasible as a matter of comparative economics; and

Whereas, research has demonstrated that forms of alcohol suitable for use as a partial substitute for gasoline can be produced from a number of agricultural products in North Carolina; and

Whereas, production of a gasoline substitute in North Carolina would reduce the State's dependence on external sources for gasoline, and could provide a less expensive fuel to the consumers of the State, and could stimulate the economy of the State;

Now, therefore, be it resolved by the House of Representatives, the Senate concurring:

Section 1. The Legislative Research Commission is authorized to study the feasibility of producing and distributing

partial fuel substitutes for gasoline from agricultural and forest products grown in North Carolina.

Sec. 2. The Commission in its study may:

(1) review the current research on gasohol and how it relates specifically to North Carolina;

(2) assess the existing technology to determine its potential for use in North Carolina;

(3) perform an economic evaluation of raw material availability, marketability, and long-run supplies;

(4) investigate and evaluate the alternatives to encourage the production, marketing, and distribution of gasohol; and

(5) make recommendations to the General Assembly concerning appropriate actions or further needs relative to producing and distributing fuel substitutes for gasoline from agricultural and forest products grown in North Carolina.

Sec. 3. The Commission may report its findings and recommendations to the 1979 General Assembly, Second Session 1980.

Sec. 4. This resolution is effective upon ratification.
In the General Assembly read three times and ratified,
this the 8th day of June, 1979.

JAMES C. GREEN

James C. Green

President of the Senate

CARL J. STEWART, JR.

Carl J. Stewart, Jr.

Speaker of the House of Representatives

ALCOHOL PRODUCTION FROM AGRICULTURAL CROPS GROWN IN NORTH CAROLINA

INTRODUCTION:

Gasohol, a blend of 90% unleaded gas and 10% ethyl alcohol is presently being sold at many gas stations in North Carolina. To partially offset our dependence on foreign oil, it is the hope of many government energy experts that up to 10% of our demands for unleaded gas can be met by an increased supply of available gasohol. To accomplish this goal will require a many-fold increase in the production of ethyl alcohol (ethanol). Any of our carbohydrate crops can serve as raw materials for the production of ethanol. Whether the ethanol obtained from these crops is reasonably priced or whether the monetary return to the farmer justifies his producing the crop for ethanol, remains to be seen.

CROP SOURCES OF ETHANOL:

Ethanol can be produced by fermentation from two types of agricultural crops grown in North Carolina. Starch crops - Cereal grains such as corn, grain sorghum, wheat, oats and barley and from white potatoes and sweet potatoes. Sugar crops - Sugarbeets, sirup sorghum and sugar sorghum.

The ethanol output per acre will depend on the amount of alcohol one can get from a crop unit and on the acre yield of the specific crop. Both of these components vary widely. A range of outputs for each crop appears in Table 1. When you speak of yields of ethanol from the various crops you see that the root crops, along with corn, outyield all others. It is shown in Table 2, however, that yield per acre alone might not be as important as price per gallon of ethanol produced. In this respect, grain sorghum, corn and barley are the cheapest sources of raw material for the production of alcohol. The farmer will get respectable returns per acre from these crops based on the expected yield levels used.

It has been suggested that culls, diseased grain and low-grade material be used in the production of ethanol. This is possible but a price must be placed on the raw material which would allow the farmer to pay for his investment.

Any ethanol plant must be in a center of crop production that will supply a ready raw material. Transportation charges must be at a minimum. The cost of converting a raw material to ethanol ranges anywhere from 40 to 60¢ per gallon. From this cost can be subtracted a credit for a feed byproduct of from 30 to 35¢. These prices will vary depending on the efficiency of the still. One also must consider the adverse effect that an abundance of distiller's grain would have on soybean prices.

FUTURE NEEDS:

Much is already known about the ethanol production process but research has to be initiated on energy-efficient crop production practices such as planting, no-till, which should give us an energy efficient production of fuel. Other research needs are in the areas of efficient fermentation, cheap and efficient stills and in controlled mileage tests.

Table 1. Range of Ethanol Turnout and Yields for Selected Crops Grown in North Carolina.

Crop	Unit yield	Gallon of ethanol per unit yield gal per unit	Crop Yields 1978-79		
			State average	Top County average	Top Farmer average
Corn	bu	2.5 to 2.7	76	103	140
Sorghum	bu	2.5 to 2.7	54	60	107
Wheat	bu	2.5 to 2.7	34	39	60
Barley	bu	2.0	51	58	74
Oats	bu	1.0	55	65	110
Sugarbeets	ton	24.0 to 29.0	--	---	19
Sirup Sorghum	ton	6 to 9	--	---	25
Sugar Sorghum	ton	8 to 11	--	---	22
White Potatoes	cwt	1.3 to 1.8	150	162	250
Sweet Potatoes	cwt	2.0 to 2.5	140	160	250

Table 2. Ethanol Production Per Acre and the Cost of Raw Material and Its Effect on the Cost Per Gallon of Ethanol. (Based on 1978 seasonal prices).

Crop	Crop yield unit/acre	Ethanol per unit gal/unit	Ethanol per acre gal	Cost of crop \$/unit	Cost per gallon
<u>Cereal</u>					
Corn	140 bu	2.6	360	\$2.35*	.90¢
Sorghum	107 bu	2.7	289	1.93	.71
Wheat	60 bu	2.7	162	2.85	1.05
Barley	74 bu	2.0	148	1.80	.90
Oats	110 bu	1.0	110	1.25	1.25
<u>Sugar</u>					
Sugarbeets	19 tons	24.9	473	----	----
Sugar sorghum	22 tons	8.0	176	----	----
Sirup sorghum	25 tons	6.4	160	----	----
<u>Starch</u>					
White potatoes	250 cwt	1.32	330	6.28	4.76
Sweet potatoes	250 cwt	2.33	582	9.00	3.86

*1979 prices of the cereal grains higher

APENDIX D

Table: State Motor Fuel Tax Incentives for Gasohol

State	Tax rate: (a)		Tax Difference (a)
	Gasoline	Gasohol	
Arkansas	9.5¢	0¢	9.5¢
Colorado	7	2	5
Connecticut	11	10	1
Iowa	10	0	10
Kansas	8	3(b)	5
Louisiana	8	0	8
Maryland	9	8	1
Montana	9	2(b)	7
Nebraska	10.5	5.5	5
New Hampshire	11	6	5
North Dakota	8	4	4
Oklahoma	6.58	0.08	6
South Carolina	10	6(b)	4
South Dakota	9	5	4
Wyoming	8	4	4

(a) Per gallon.

(b) As of October 1, 1979; rate on gasohol scheduled to change--see text.

The incentives in Kansas, Montana, and South Carolina provide for the tax benefit to decrease with time. In Kansas and South Carolina gasohol will eventually again be taxed at the same rate as gasoline. (See the summaries of the statutes, beginning page 5.) Several of the other measures--those in Colorado, Iowa, New Hampshire, South Dakota, and Wyoming--also contain expiration clauses, which will take effect variously between 1982 and 1985.

Kansas and South Carolina provide that the rate on gasohol will expire sooner than scheduled if the revenue lost reaches \$5 million. Montana specifies that if the regular rate on gasoline should fall below the rate on gasohol, gasohol will be taxed at the lower rate. The governor of Montana is authorized to end the gasohol incentive if the revenue loss significantly hampers highway construction or repair.

Sales taxes. Indiana, Louisiana, and South Dakota exempt gasohol from sales tax, which is levied on other sales of motor fuels in those states. Indiana has no other tax break for gasohol.

Property taxes. Three states, Colorado, Montana, and Oregon, give property tax breaks to property used primarily or exclusively in the production of gasohol or alcohol for gasohol. Oregon exempts such property, while Colorado and Montana provide special low assessment rates for it. The Colorado and Oregon measures have expiration provisions taking effect in the mid-1980's; the special Montana classification is permanent. The Colorado benefit is limited to facilities producing no more than 2.5 million gallons of alcohol a year.

Income taxes. Oregon exempts income derived from certified facilities producing alcohol for gasohol from its corporate and personal income taxes.

Gross receipts taxes. Washington exempts the receipts derived by manufacturers of alcohol from its sale for gasohol from the business and occupation (gross receipts) tax.

SOURCE: FEDERATION OF TAX ADMINISTRATORS
444 North Capitol Street, N. W.
Washington, D. C. 20001

APPENDIX E

EXPERIENCE WITH TAX INCENTIVES TO ENCOURAGE USE OF GASOHOL TO CONSERVE GASOLINE IN STATES SUPPLYING USEABLE DATA DURING INDICATED MONTHS.

NOTE: Gasohol is generally defined as gasoline containing an admixture of at least 10% ethyl alcohol derived from agricultural products.

<u>State</u>	<u>Month</u>	<u>Tax Incentive Per Gallon</u>	<u>Total Gallons Gasoline Sold</u>	<u>Gallons of Alcohol</u>		<u>Alcohol as Percentage of Total Gasoline Sold</u>
				<u>Contained in Gasohol sold</u>		
Iowa	Aug, 79	10¢	144,196,822	513,801		0.36%
Iowa	Sep, 79	10¢	129,929,171	165,182		0.13%
Maryland	Oct, 79	1¢	163,209,287	13,955		0.01%
North Dakota	Sep, 79	4¢	48,707,429	6,900		0.14%
South Carolina	Oct, 79	4¢	109,900,097	56,697		0.052%

APPENDIX F

LEGISLATIVE PROPOSAL #1

A BILL TO BE ENTITLED

AN ACT TO GIVE AN INVESTMENT TAX CREDIT TO FUEL ETHANOL DISTILLERS.

The General Assembly of North Carolina enacts:

Section 1. A new section is added to the General Statutes to read:

"§105-130.27. Credit against corporate income tax for construction of a fuel ethanol distillery.--(a) Any corporation which constructs in North Carolina a distillery to make ethanol from agricultural or forestry products for use as a motor fuel shall be allowed a credit against the tax imposed by this division equal to twenty percent (20%) of the installation and equipment costs of construction, and an additional ten percent (10%) of those costs if the distillery is powered primarily by use of an alternative fuel source. In order to secure the credit allowed by this section, the taxpayer must own or control the distillery at the time of construction, and payment for the installation and equipment must be made by the taxpayer during the tax year for which the credit is claimed. The amount of the credit allowed for any one income year shall be limited to twenty percent (20%) of the costs paid during the year, or thirty percent (30%) of those costs if the distillery is powered primarily by use of an alternative fuel source. Invoices or receipts shall be furnished to sub-

stantiate a claim or a credit under this section if requested by the Secretary of Revenue. The credit allowed by this section shall not exceed the amount of the tax imposed by this division for the taxable year reduced by the sum of all credits allowable under this division, except for payments of tax made by or on behalf of the taxpayer.

(b) For purposes of this section, 'alternative fuel source' includes agricultural and forestry products, waste petroleum products, and peat, but does not include other petroleum products, coal, or natural gas.

(c) The amount of credit allowed under this section may be carried over for the next succeeding five (5) years."

Sec. 2. A new section is added to the General Statutes to read:

"§105-151.6. Credit against personal income tax for construction of a fuel ethanol distillery.--(a) Any person who constructs in North Carolina a distillery to make ethanol from agricultural or forestry products for use as a motor fuel shall be allowed a credit against the tax imposed by this division equal to twenty percent (20%) of the installation and equipment costs of construction, and an additional ten percent (10%) of those costs if the distillery is powered primarily by use of an alternative fuel source. In order to secure the credit allowed by this section, the taxpayer must own or control the distillery at the time of construction,

and payment for the installation and equipment must be made by the taxpayer during the tax year for which the credit is claimed. The amount of the credit allowed for any one income year shall be limited to twenty percent (20%) of the costs paid during the year, or thirty percent (30%) of those costs if the distillery is powered primarily by use of an alternative fuel source. Invoices or receipts shall be furnished to substantiate a claim of a credit under this section if requested by the Secretary of Revenue. The credit allowed by this section shall not exceed the amount of the tax imposed by this division for the taxable year reduced by the sum of all credits allowable under this division, except for payments of tax made by or on behalf of the taxpayer.

(b) For purposes of this section, 'alternative fuel source' includes agricultural and forestry products, waste petroleum products, and peat, but does not include other petroleum products, coal, or natural gas.

(c) The amount of credit allowed under this section may be carried over for the next succeeding five (5) years."

Sec. 3. This act is effective with respect to taxable years beginning on and after January 1, 1980.

Explanation of Proposal:

Allow a state personal or corporate income tax credit for up to 20% of the cost of constructing a distillery for the production of gasohol, effective January 1, 1980. The credit was to be 30% if the distillery was fueled by alternative fuel sources. The credit would be limited to tax liability and any unused credit could be carried forward from year-to-year up to 5 years.

Fiscal Effect:

Estimates of the reduction in General Fund revenue are speculative at this time because no plants have been built and little capacity or cost data exists regarding the four proposed plants. Another complication is the fact that it is impossible at this time to determine whether all of the proposed plants will be constructed and will be profitable. There are a number of uncertainties regarding the market for gasohol in North Carolina for the next couple of years. The uncertainties include:

- (1) the popularity of gasohol with the public, which will depend in part on how much higher the price of gasohol will be
- (2) the availability of gasohol, which will depend on
 - (a) amount of excess crop supplies
 - (b) uses, for, and therefore cost of, excess crops
 - (c) cost of financing distilleries
 - (d) availability of distillery components
 - (e) federal tax incentives

A factor that would limit large revenue loss in the first couple of years is the fact that the amount of the credit is limited by the tax liability of the distillery owner. With the current uncertainties regarding the market and high financing costs, it may be years before any plants are profitable and could thus use the credit.

LEGISLATIVE PROPOSAL #2

A BILL TO BE ENTITLED
AN ACT TO GRANT TO GASOHOL A PARTIAL EXEMPTION FROM THE
GASOLINE AND SPECIAL FUELS TAX.

The General Assembly of North Carolina enacts:

Section 1. A new section is added to the General Statutes to read:

"§105-437. Taxation of alcohol fuels.--(a) Sale, distribution, and use of a blend of motor fuel and a minimum of ten percent (10%) anhydrous ethanol are subject to the tax described in G.S. 105-434 except:

- (1) from January 1, 1981 through June 30, 1981,
the tax is five cents (5¢);
- (2) from July 1, 1981 through June 30, 1982,
the tax is six cents (6¢);
- (3) from July 1, 1982 through June 30, 1983,
the tax is seven cents (7¢);
- (4) from July 1, 1983 through June 30, 1984,
the tax is eight cents (8¢).

No refund or rebate allowed under this Article for the purchase of such a blend shall exceed the motor fuels tax on that blend, reduced by one cent (1¢).

(b) Non-anhydrous ethanol is exempt from the tax described in this section and in G.S. 105-434 if that ethanol is not for sale or distribution."

Sec. 2. A new section is added to the General Statutes to read:

"§105-446.4. Refund of taxes paid on gasohol.--(a) Any person, association, firm, or corporation not licensed as a distributor with the North Carolina Department of Revenue who purchases motor fuel and blends it with a minimum of ten percent (10%) anhydrous ethanol and who pays more tax thereon than is required by G.S. 105-437 is entitled to reimbursement for the overpayment upon the following conditions and in the following manner:

- (1) All claims for refunds under this section shall be filed with the Secretary of Revenue on forms prescribed by him on or before the last day of January, April, July, and October of each year, covering motor fuel purchased during the quarterly period immediately preceding the month in which the application is filed. In all applications for reimbursement, the applicant shall state whether or not he has filed a North Carolina income tax return with the Secretary of Revenue, and all applications shall be made upon oath or affirmation. Each application shall show on its face that the purchase price has been secured to the seller's satisfaction. Refunds made

pursuant to claims filed after the dates specified above are subject to the following late filing penalties: applications filed within 30 days after those dates, twenty-five percent (25%); applications filed after 30 days but within six months, fifty percent (50%); but refunds applied for after six months following those dates are barred.

- (2) The Secretary of Revenue has authority to issue rules as to how claims are filed and the information that is submitted with the claims and the records required to support the claims.
- (3) If, upon the filing of an application, the Secretary of Revenue is satisfied that it is made in good faith and the motor fuel upon which the tax refund is requested has been or is to be used exclusively for purposes set forth in the application, he shall issue to the applicant a warrant upon the State Treasurer for the tax refund.
- (4) If the Secretary of Revenue is satisfied that the applicant for any refund authorized by this section has collected or sought to collect any refund of tax of motor fuel which has not been blended with a minimum of ten percent (10%) anhydrous ethanol, he shall

issue to the applicant notice to show cause why the application should not be disallowed. The notice shall state a time and place of hearing upon the notice. If, at the hearing, the Secretary finds as a fact that the applicant has collected or sought to collect any refund on motor fuel not so blended, he shall disallow the application in its entirety and the applicant shall be required to pay all tax which has been refunded to him on the application.

- (5) Any applicant for a refund may seek administrative review or appeal from the decision of the Secretary of Revenue under the provisions of G.S. 105-241.2, G.S. 105-241.3, and G.S. 105-241.4.
- (6) If at any time in the opinion of the Secretary there is reason to doubt the accuracy of the facts set forth in any application for a tax refund, he may refer the matter to any agent of the Department of Revenue, and that agent shall make a careful investigation of all the facts and circumstances relating to the application in the use of the motor fuels therein referred to, and shall have a right to have access to the books and records of any retailer or distributor of motor fuels products for the

purpose of obtaining the necessary information concerning such matters, and shall make due report thereof to the Secretary of Revenue.

(7) If any court of last resort holds that the provisions for refund in this section render the levying and collecting of the tax under this Article invalid, it is the intention of the General Assembly that these provisions for refund shall be annulled and the tax shall be levied without any provisions for refund and that this Article shall be so construed.

(b) Any person making a false application or affidavit for the purpose of securing a refund to which he is not entitled under the provisions of this section is guilty of a misdemeanor and upon conviction thereof shall be fined not exceeding five hundred dollars (\$500.00) or imprisoned not exceeding two years."

Sec. 3. G.S. 105-449.16 is amended by designating the present language as subsection (a) and adding two new subsections to read:

"(b) Sale, distribution, and use of a blend of gasoline or fuel and a minimum of ten percent (10%) anhydrous ethanol, which is not subject to taxation under Article 36 of this Chapter, are subject to the tax described in subsection (a) of this section except:

- (1) from January 1, 1981 through June 30, 1981,
the tax is five cents (5¢);
- (2) from July 1, 1981 through June 30, 1982,
the tax is six cents (6¢);
- (3) from July 1, 1982 through June 30, 1983,
the tax is seven cents (7¢);
- (4) from July 1, 1983 through June 30, 1984,
the tax is eight cents (8¢).

(c) Non-anhydrous ethanol is exempt from the tax described in this section if that ethanol is not for sale or distribution."

Sec. 4. G.S. 105-449.24 is amended by inserting between the phrase "G.S. 105-446.3," and the phrase "G.S. 105-446.5" the phrase "G.S. 105-446.4,".

Sec. 5. G.S. 105-449.24 is further amended by adding a second sentence to read: "No refund or rebate allowed under this Article for the purchase of a blend of gasoline or fuel and a minimum of ten percent (10%) anhydrous ethanol shall exceed the special fuels tax on that blend, reduced by one cent (1¢)."

Sec. 6. This act shall become effective on January 1, 1981, and shall cease to be effective on July 1, 1984.

EXPLANATION OF PROPOSAL:

Reduces the motor fuel tax rate on gasohol from 9¢ per gallon to 5¢ effective January 1, 1981.

FISCAL EFFECT:

Would reduce Highway Fund motor fuel tax collection by an estimated \$300,000 - \$500,000 for the 1980-81 fiscal year. With an effective date of January 1, collections for five months (February - June) would be affected. The loss for 1981-82 would be \$1 - 2 million, depending on a number of factors, including:

- (1) the popularity of gasohol with the public
- (2) the price of gasohol, relative to other motor fuels
- (3) the supply of gasohol, which depends on
 - (a) crop prices
 - (b) the need for North Carolina agricultural products for other uses
 - (c) cost and availability of financing
 - (d) transportation costs
 - (e) the demand for gasohol in other states
 - (f) federal production and tax incentives
 - (g) lead-time in constructing distilleries and availability of distillery components

A BILL TO BE ENTITLED

AN ACT TO APPROPRIATE MONEY FOR ALCOHOL FUELS RESEARCH.

The General Assembly of North Carolina enacts:

Section 1. There is appropriated from the General Fund to the Board of Governors of the University of North Carolina for fiscal year 1980-81 the sum of one hundred seventy-five thousand dollars (\$175,000) for the purpose of research by faculty and staff of North Carolina State University on the production, distribution, and use of alcohol fuels. These funds are in addition to all other funds appropriated to the Board of Governors.

Sec. 2. This act shall become effective on July 1, 1980.

LEGISLATIVE PROPOSAL #4

A JOINT RESOLUTION TO AUTHORIZE THE LEGISLATIVE RESEARCH COMMISSION TO CONTINUE TO STUDY THE POSSIBLE PRODUCTION, DISTRIBUTION, AND USE OF ALCOHOL FUELS IN NORTH CAROLINA.

Be it resolved by the House of Representatives, the Senate concurring:

Section 1. The Legislative Research Commission is authorized to continue to study the potential for the production, distribution, and use of alcohol fuels in this state.

Sec. 2. The Commission may report its findings and recommendations to the 1981 General Assembly.

Sec. This resolution is effective upon ratification.

Governor's Blue Ribbon Study Commission

On Transportation Needs And Financing



Dan K. Moore,
Chairman

Post Office Box 26865
Raleigh, North Carolina 27611

May 13, 1980

William F. Absher

Steve Arthur

Cliff Benson, Sr.

Micou F. Browne

Cliff Cameron

Shelton Castleberry

Joe Doster

Beth Finch

Jimmy Glenn

J. J. Harrington

Ed Holmes

Wallace Hyde

Thebaud Jeffers

Garland King

Jack Kirksey

J. T. Knott, Jr.

Lloyd Massey

Jim Melvin

R. A. Mitchell

Leander Morgan

John Willie Oxendine

Lib Phillips

Trent Ragland, Jr.

Liston Ramsey

Kenneth Royall, Jr.

John Sledge

Pat Spangler

John Tolson

Harry Vanderlinden

Warren Wheeler

Ellen Williams

George Wood

The Honorable James Garrison
The Honorable Vernon James
North Carolina General Assembly
Raleigh, North Carolina 27611

Dear Senator Garrison and Representative James:

On behalf of the Finance Committee of the Blue Ribbon Commission on Transportation Needs and Financing, let me convey to you the Committee's reaction to the proposals of the Gasohol Study Committee. The Finance Committee supports the proposals to provide incentives for the production and consumption of gasohol. The Finance Committee also appreciates the sentiments of the proposal that would cover the loss of highway revenues from a gasohol tax exemption by raising the motor fuel tax by $\frac{1}{4}$ ¢.

It is highly likely that the Blue Ribbon Commission, in its report to the Governor will be recommending some changes in the motor fuel tax to the 1981 General Assembly. Due to this possibility, the Finance Committee strongly prefers that no request for a change in the motor fuel tax be presented to the 1980 session of the General Assembly. The Committee believes that a request for action in the 1980 session may jeopardize a request in the 1981 session. The Committee would rather suffer the very small loss of tax revenues due to the gasohol exemption for one year rather than to take gasoline tax proposals piecemeal to the Legislature.

Please consider this request from the Finance Committee as you make your deliberations on May 10 in your Study Committee meeting.

Sincerely,

Governor Dan K. Moore
Chairman

DKM:ag

cc: A. W. Turner



State of North Carolina

Department of Agriculture

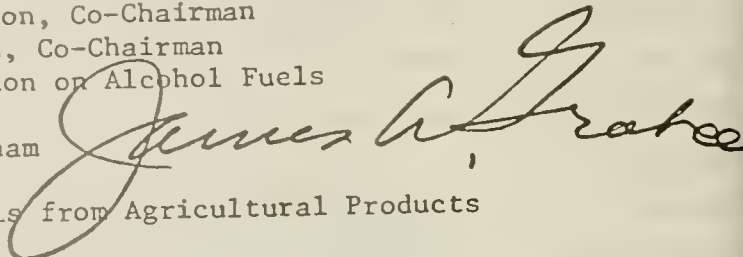
Raleigh

March 18, 1980

JAMES A. GRAHAM
COMMISSIONER

MEMORANDUM

TO: The Honorable James Garrison, Co-Chairman
The Honorable Vernon James, Co-Chairman
Legislative Study Commission on Alcohol Fuels

FROM: Commissioner James A. Graham 

SUBJECT: Production of Alcohol Fuels from Agricultural Products

I am pleased to note that a distinguished group of individuals was selected by the General Assembly to study the question of gasohol as it may affect our State. As you are well aware, a mass of information and, unfortunately, misinformation has been published on this topic.

Recognizing that alcohol fuels is a subject of considerable interest to the agricultural community in North Carolina, I formed a Gasohol Working Group in the Department last October. In attempting to develop the parameters on the topic the group developed a preliminary set of questions (attached) which were addressed to the agricultural experts at NCSU for reply. I anticipate we should receive this information soon.

In my travels throughout the State, I have come to recognize that there is a genuine interest by farmers for factual information on the production and use of low-grade alcohol fuels on the farm. As a result, I have, by letter, suggested to Dean Legates investigating the feasibility of initiating a research project. The proposal calls for the "construction of a fair-sized plant for production of 'low-grade' alcohol designed for 'on farm' use . . . Such a unit could be operated for one to two years . . . in order to gain operational experience and economic facts on its viability for dissemination to the farming community (and) . . . it would also be appropriate to test the use of alcohol produced by the unit in several tractors and gasoline-operated trucks specifically for 'on farm' use." It is my personal belief that such a project would go a long way in dispelling any myths about what "on farm" use of alcohol can and cannot do. We may need legislative help on such a project.

I know you gentlemen are wrestling with the problem of what, if any, financial assistance the General Assembly should consider to support the production of alcohol fuels. I believe that extreme caution is in order in this area as the Federal Government, via pending legislation on the "windfall profits tax" and the massive "synthetic fuels bill" will provide a significant stimulus to alcohol production through direct loans, guaranteed loans, tax credits, tax exemptions, etc.

Considering the fact that State and local governments may be faced with a reduction in Revenue Sharing funds, that gasoline may soon be \$1.35 per gallon, that State government may need a larger fuel budget in FY 1980-81, it may be a difficult time to increase the gasoline tax to provide funds for alcohol production or to reduce the State road tax on gasohol to stimulate production in a major way. I think the modest proposal suggested by Senator Garrison raising the tax on unleaded fuel one or two cents and reducing the tax on gasohol an amount equal to the anticipated gain in revenue is worth close examination by both the Revenue and Highway officials.

Finally, a brief word about the Russian grain embargo. Although some grain will probably be available because of this event, it is probably a temporary aberration. There is a general rise in foreign purchases of U. S. grains which it is anticipated will continue in the future. Plans for the construction of major commercial alcohol plants should not be developed on the basis of an embargo.

If I can provide additional support in your deliberation, I will be happy to.

With all good wishes.

JAG:rcp

Enclosures

1. What is the current availability of agricultural feedstocks in North Carolina which could be used to produce alcohol?
2. How much unused crop land could reasonable be made available for growing alcohol feedstocks at today's market prices?
3. What are the most logical feedstocks to be grown in North Carolina for alcohol production? What are the critical differences between these feedstocks that make some better than others?
4. Could North Carolina become competitive in producing grains for alcohol production compared to the major grain producing states in the mid-West?
5. What is likely to be the effect of the production of substantial quantities of distillers dried grains as a by-product of the distillation process on the price of competing products such as soybean meal used as a feed for livestock, etc.? Is there a market?
6. Is it practical to encourage the use of "idle land" for the production of crops to be used as feedstock for producing alcohol?

Note: Subsidiary questions may be a) How marginal may the "idle land" be for crop growing purposes? b) Is it, for the most part, land difficult to till and subject to drainage/soil erosion problems, etc.? c) How would its use affect other agricultural programs?

7. If grain or other crops produced in North Carolina is diverted to the production of alcohol because of a greater monetary return, what would be the overall effect of any such widespread practice?
8. If ethanol is produced in the state for fuel use what is the most logical distribution system to be developed for such a product?
9. Assuming that wood and other cellulosic materials constitute the largest potential feedstock for alcohol fuel production in North Carolina, how soon are economically feasible conversion processes likely to be available on the market?
10. Would the production processes referred to in the previous question likely be used by individual farmers, cooperatives, or on an industrial scale?
11. Would the widespread use of wood as alcohol feedstock interfere with the use of other forms of wood energy such as pellets, chips, or sawdust?

12. Can you identify other major external (out-of-state) economic factors not answered in a previous question that would affect the decision to use or produce alcohol for gasohol in North Carolina? What is their potential effect?

13. What, if any, environmental problems are associated with the production of alcohol for (1) use in gasohol or (2) use "straight" as an on-the-farm fuel?



NORTH CAROLINA
DEPARTMENT
OF COMMERCE

April 25, 1980

The Honorable James B. Garrison, Senator
The Honorable Vernon G. James, Representative
Co-Chairmen, Legislative Gasohol Study Commission
North Carolina General Assembly
Raleigh, North Carolina

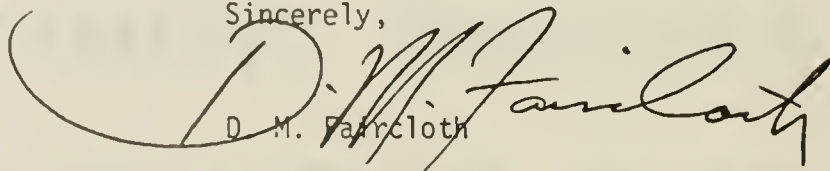
Gentlemen:

The North Carolina Energy Policy Council met on April 23, 1980. Among the items considered was a report by the Council's Research and Development Committee on the subject of alcohol fuels. After careful consideration of the report the Council adopted the following motion:

- "1) To support a pending proposal of the Legislative Gasohol Commission to recommend to the "short" session of the General Assembly that it enact legislation to provide a 4-cent-per-gallon reduction in the road tax on gasohol sales BUT to be OFFSET by an increase in the tax on the sales of other forms of gasoline ONLY to the extent necessary to compensate for the 4-cent reduction on gasohol.
- 2) That \$500,000 be appropriated from the General Fund for the purpose of conducting research and demonstration at NCSU to determine the feasibility of producing low-grade alcohol fuels (non-anhydrous) in a simulated cooperative venture and to determine the feasibility of using low-grade alcohol in vehicles and equipment in an "on-farm" environment. In view of the interest in this topic, tests and results should be disseminated as soon as practicable."

Should you have any questions on this action of the Council I shall be happy to discuss them with you.

Sincerely,



D. M. Faircloth

DMF/JEGjr/nc
cc: Executive Director, N. C. Energy Policy Council
Chairman, R. & D. Committee, N. C. Energy Policy Council

