Approved: February 13, 2001
Date

MINUTES OF THE SENATE AGRICULTURE COMMITTEE.

The meeting was called to order by Chairperson Derek Schmidt at 8:30 a.m. on February 7, 2001 in Room 423-S of the Capitol.

All members were present except:

Committee staff present:
Raney Gilliland, Legislative Research Department
Jill Wolters, Revisor of Statutes
Betty Bomar, Secretary

Conferees appearing before the committee:
Jere White, Kansas Corn Growers Association/Kansas Grain Sorghum Producers
Bill Pracht, East Kansas Agri Energy
Jill Zimmerman, Extension Agent, Anderson County
Dale Ladd, Extension Agent, McPherson County
Jeff Torluemke, Senior Vice President, State Bank of Hoxie, Heartland Energy
Scott Whitefoot, NESIKA Energy, Republic County

Others attending: See attached list

Senator Huelskamp moved, seconded by Senator Taddiken that the January 31, 2001 Minutes be corrected to include a motion made by Senator Huelskamp and seconded by Senator Taddiken that a bill be introduced regarding the Competitive Livestock marketing act. A voice vote was unanimous in favor of the motion.

Jere White, Executive Director, Kansas Corn Growers Association and Kansas Grain Sorghum Producers Association testified as to the potential for ethanol production in Kansas. He stated a variety of new uses are being developed for ethanol and the co-products associated with its production. Ethanol has been gaining in popularity as a road and power-line de-icer, and a new generation of both stationary and mobile fuel cells powered by ethanol are beginning to emerge.

Mr. White stated currently there are 55 operating ethanol production facilities in the United States. Kansas presently has 4 facilities in production and there are three additional groups who are undertaking feasibility studies to determine the viability of constructing additional plants. Michael Evans, in *The Economic Impact of the Demand for Ethanol, February 1997*, calculated that the net effect of ethanol demand in 1997 would boost corn production by 42 billion bushes, increase the price of corn by $.45 per bushel, increase tax receipts, both federal and state, and increase the balance of trade offsetting crude oil imports by exporting ethanol byproducts. The Evans report is bullish on the economic benefits of ethanol production.

Mr. White stated the greatest economic impact derived from ethanol production in the order of significance is: high capital investment and construction cost, high dollar volume sales, agricultural impact, creation of jobs with higher than average wage scale, high percentage of revenue remains in state, multiple plant opportunities, state and local taxes paid, energy consumption, and the ability to reduce Kansas and U.S. gasoline imports.

Mr. White stated that a large percentage of corn produced in Kansas is fed to cattle. An ethanol plant would be able to take the corn and sorghum, produce ethanol, and sell the dried distillers grains and solubles (DDGS) back to feedlots, thereby, impacting the price paid for corn and sorghum as feedlots would have an acceptable substitute for raw corn and sorghum. (A copy of Kansas Ethanol Plant Feasibility Study, on file in the Legislative Research Department) (Attachment 1)

Mr. White submitted additional attachments relating to tax incentives (Attachment 2) and *How Much Energy Does It Take to Make a Gallon of Ethanol?* (Attachment 3)

Bill Pracht, Westphalia, Kansas, testified he has an operation consisting of 3000 acres of row crops and 275 head of mother cows. Since the Freedom to Farm Act, he has rotated out of wheat to 40% feed grain and 55% beans.

Mr. Pracht testified the Eastern Kansas Agri Energy (EKAE) is a group of 47 producers and agribusiness people from Anderson County and the surrounding area, who, with the assistance of the Anderson County Economic Development Committee (ACED) had a pre-feasibility study done which showed promise for an ethanol plant to be built in their area. EKAE toured two plants in Missouri. Both plants stressed the importance of State funded incentives to ensure profitability of these plants. In Missouri plants receive 20 cents per gallon for the first 12 ½ million gallons, after which they receive 5 cents per gallon for the second 12 ½ million gallons. There were no ethanol plants built in Missouri until the funding incentives were in place. (Attachment 4)

Mr. Pracht stated that Kansas has not had a good crop year since 1998. The fact that 47 people have invested $1000 each at-risk money to finish the feasibility study and provide some start up money speaks to their desire to add value to their crop production. An ethanol plant adds about 30 jobs to the community, adds a source of livestock feed to area producers which may expand cattle and dairy operations, and adds 5 to 10 cents in feed grain prices.

Jill A. Zimmerman, Anderson County Extension Agent, testified the agriculture industry is changing at a rapid pace and it is important to know what producers need and want in order to help them remain competitive in the agriculture industry. Ms. Zimmerman served on the ACED Committee and as chairperson of the agriculture sub-committee, investigated opportunities to provide added value to agriculture in Anderson County. In this process, a template provided by the two grain commissions and the Department of Commerce and Housing was utilized for a pre-feasibility study before hiring Bryan and Bryan, Inc., of Cotopaxi, Co who completed a more in-depth analysis. Through this process, it became apparent that there is a true need for a source of reliable, non-biased information and guidance regarding ethanol production. Other states have such a support base to draw upon. K-State Research and Extension is working to develop such a knowledge base which can be utilized by those interested in pursuing ethanol production in their own communities. (Attachment 5)

The magnitude of the Anderson County project has the potential to have a huge impact on agriculture in the state of Kansas. Ms. Zimmerman is of the opinion that the expansion of ethanol production in the state of Kansas will have a positive impact for Kansas, for agriculture and for rural communities for many years to come.

David Ladd, Extension Agent, McPherson-Rice County area, stated the blend of a large grain sorghum production area adjacent to a relatively large feedlot area encouraged a group of farmers, feeders, and agri-businessmen to explore the feasibility of an ethanol plant in the McPherson-Rice county area. The six county area surrounding the Lyons or McPherson site annually processes about 32 million bushels of grain sorghum which is largely exported out of the area. Additionally, the presence of between 100-150,000 head of feedlot cattle creates an attractive target for utilization of the by-product of ethanol production. (Attachment 6)

The McPherson Chamber of Commerce agriculture committee, several area cooperatives, and a group of central Kansas feedlots have been working together intensively for five months studying the economic feasibility of converting grain sorghum into a renewable fuel while, at the same time, providing a high quality concentrate product to cattle feeders. Preliminary studies show that an ethanol production facility in central Kansas has the potential for being profitable, due largely to two competitive advantages: 1) a nearby source of abundant grain sorghum which is priced discount to corn, and 2) nearby feedlots which could utilize the by-product on a "wet" basis to avoid expensive natural gas drying costs. Other advantages for the area include shorter freight routes to certain metro markets, the possibility of establishing a "co-generation" relationship with nearby industry, and adequate commercial grain storage already in place.

Mr. Ladd stated the economic impact of an ethanol plant will reach not only grain farmers and feedlots, but local communities where skilled jobs will be created and services and utilities purchased.

Jeff Torluemke, Senior Vice President, State Bank of Hoxie, stated he represents a small, but enthusiastic group in northwest Kansas looking at the feasibility of an ethanol plant in their area. He stated it was premature for him to be testifying as he was still on the learning curve and could provide few answers. The group has contracted with a company from South Dakota to conduct a feasibility study, and they have been working with other resource personnel within the state.

Mr. Torluemke introduced Brian Bowman, who is also working on the project and who is a farmer who farms about 10, 000 acres, feeds about 10,000 cattle and whose feed yard is presently leased out to Heartland Cattle Company, McCook, Neb. Mr. Bowman stated he had recently met with Heartland and their nutritionist, who is a brother of the Governor of the State of Nebraska, and is quite informed as to ethanol by-products. An ethanol plant being close to a feed yard provides the feed lot a consistent product for their cattle. Presently, our property is too far from the ethanol plants in Nebraska. There are feed lots in the Hoxie area who are interested in utilizing the by-product, which is a consistent product and is necessary to alleviate the swings experienced in the cattle industry.

Mr. Bowman stated the preliminary feasibility study numbers are good, ethanol production would be good for Kansas. Kansas is behind. We have money available from people in Nebraska, we have people out of Nebraska willing to buy our products, we need some support from Kansas. It would be a boost to our economy. Ethanol provides a clean and safe product. It does not contaminate air, food or water.

Scott Whitefoot, NESIKA Energy LLC, Scandia, stated ethanol production is beneficial to rural Kansas. He toured an ethanol plant in Claremont, Minnesota, and has spent time with Lee Reeves in Garden City. Currently NEISKA owns and operates 6.5 million bushels of licensed grain space in northcentral Kansas and has a 20 - 25 thousand head of cattle feed operation. They have had a pre-feasibility study done by a firm in Claremont, Minnesota; have contracted with a firm in Johnson County to do a site specific feasibility study, business plan and marketing plan. Presently, they are investigating financing sources. Mr. Whitefoot believes that in establishing an ethanol plant in their area of the state the entire area would benefit economically.

Kansas Ethanol Producers distributed a book entitled _2000 Fuel Ethanol Fact Book_, (A copy is on file in the office of the Legislative Research Department)

The meeting adjourned at 9:30 a.m.

The next meeting is scheduled for February 13, 2001.

SENATE AGRICULTURE COMMITTEE GUEST LIST

DATE: February 7, 2001

NAME	REPRESENTING
MELEESA YOUNGGREN	KDOC&H AG PRODUCTS
DALE LADD	McPherson Co. Extension
Julie [illegible]	Senator Morris
Rebecca Reed	KDA
Connie Fischer	KDOC&H - Ag.
GREG FOLEY	KDA
Jill Zimmerman	K-State Research & Ext.
Bill Pracht	Eastern Ks Agri: Energy
JERE White	KCGA-KGSPA
Scott Whitefoot	United Grain - Republic County
Jeff Strnad	Premium Feeders
MYRON BOURAY	Bill CO
Thayne LARSON	Bestifor Farms Inc.
Greg Krissek	KS Corn Growers

Senate Agriculture Committee
Date 2-07-01
Attachment #1-1 thru 1-13

ethanol

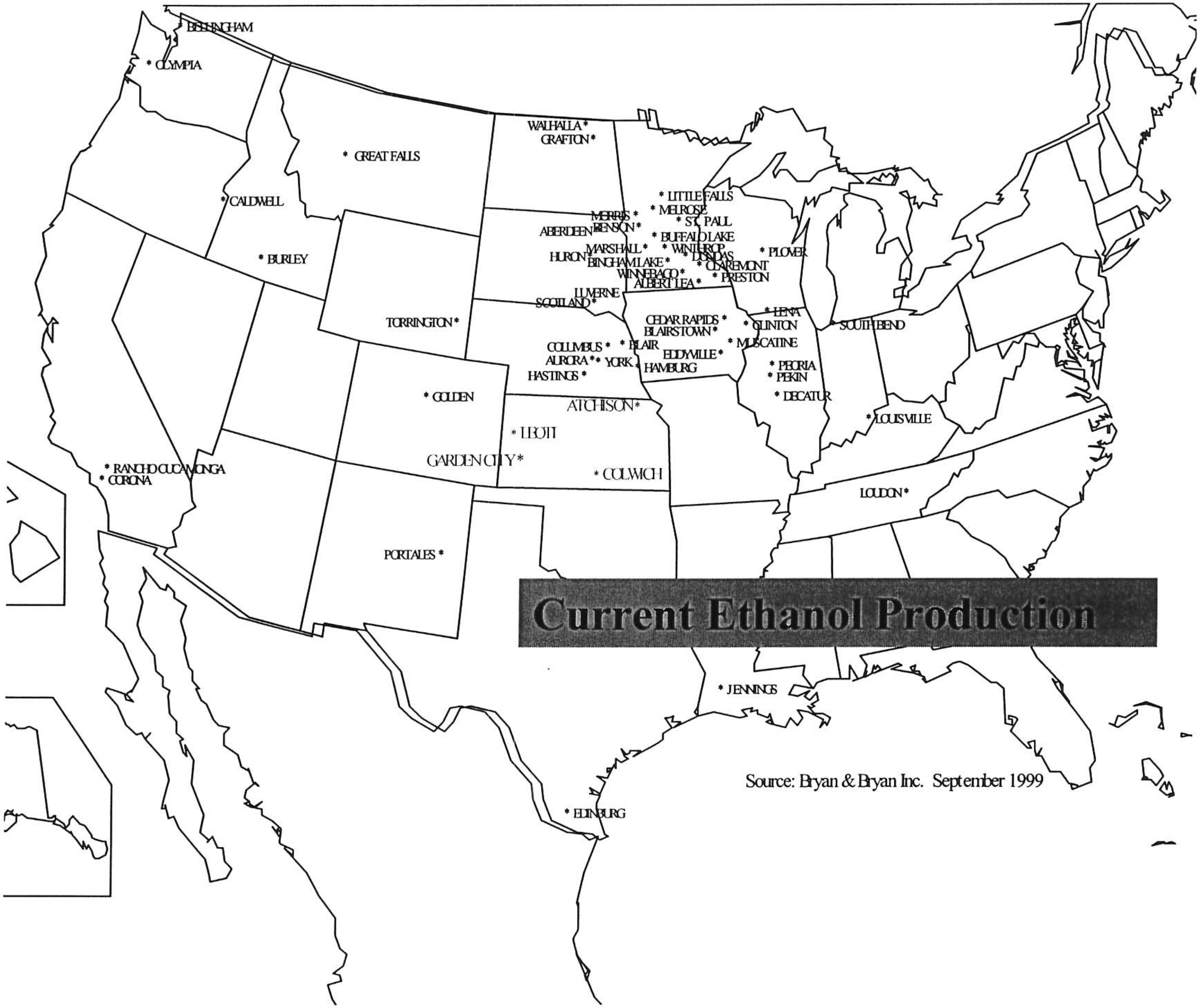
A look at the potential for ethanol production in Kansas

Jere White, Executive Director

Kansas Corn Growers Association

Kansas Grain Sorghum Producers Association

1.2



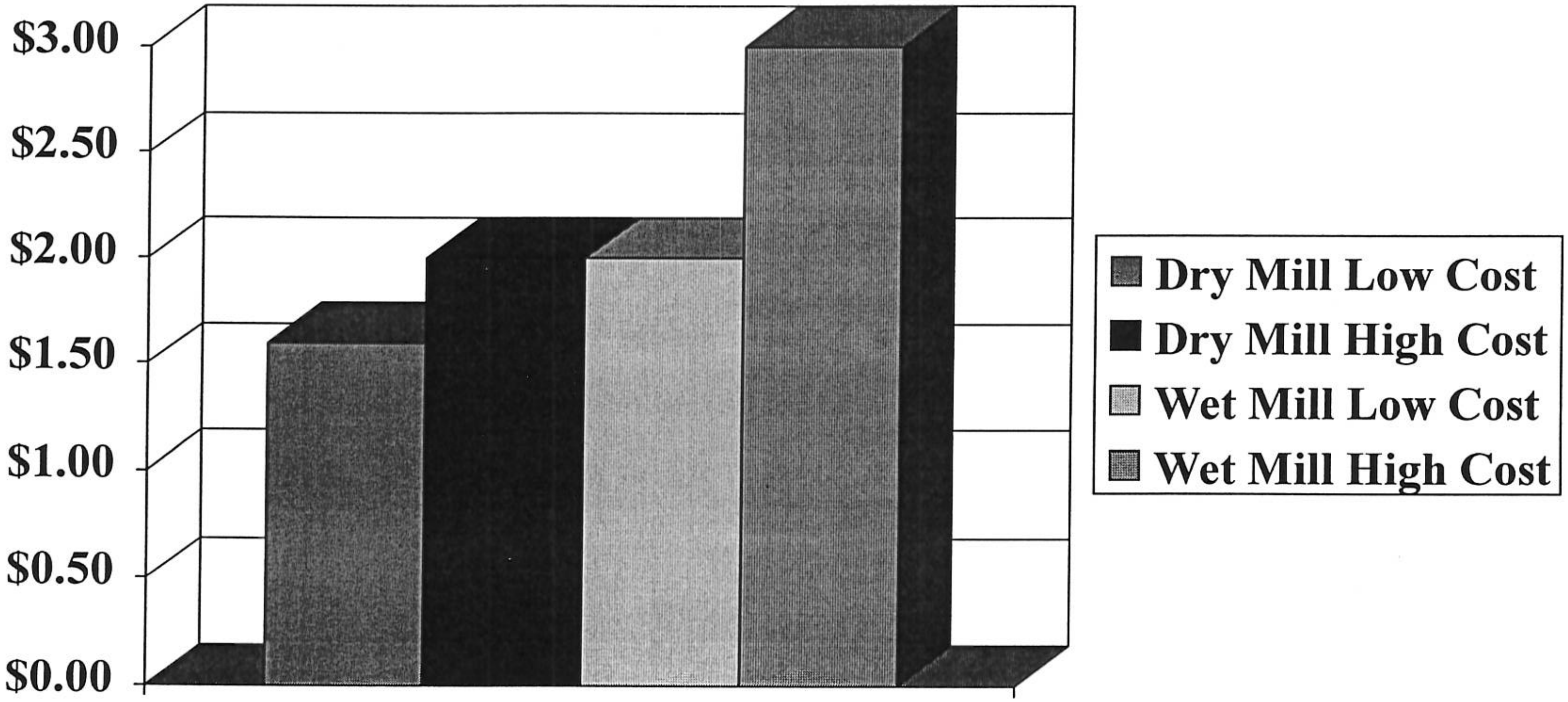
Current Ethanol Production

Source: Bryan & Bryan Inc. September 1999

ECONOMIC IMPACT OF ETHANOL PRODUCTION

- High Capital Investment and Construction Cost
- High Dollar Volume Sales
- Agricultural Impact
- Creation of Jobs with Higher than Average Wage Scale
- High Percentage of Revenue Remains in State
- Multiple Plant Opportunities
- State and Local Taxes Paid
- Energy Consumption

Average Cost of Construction



Considerations in Location

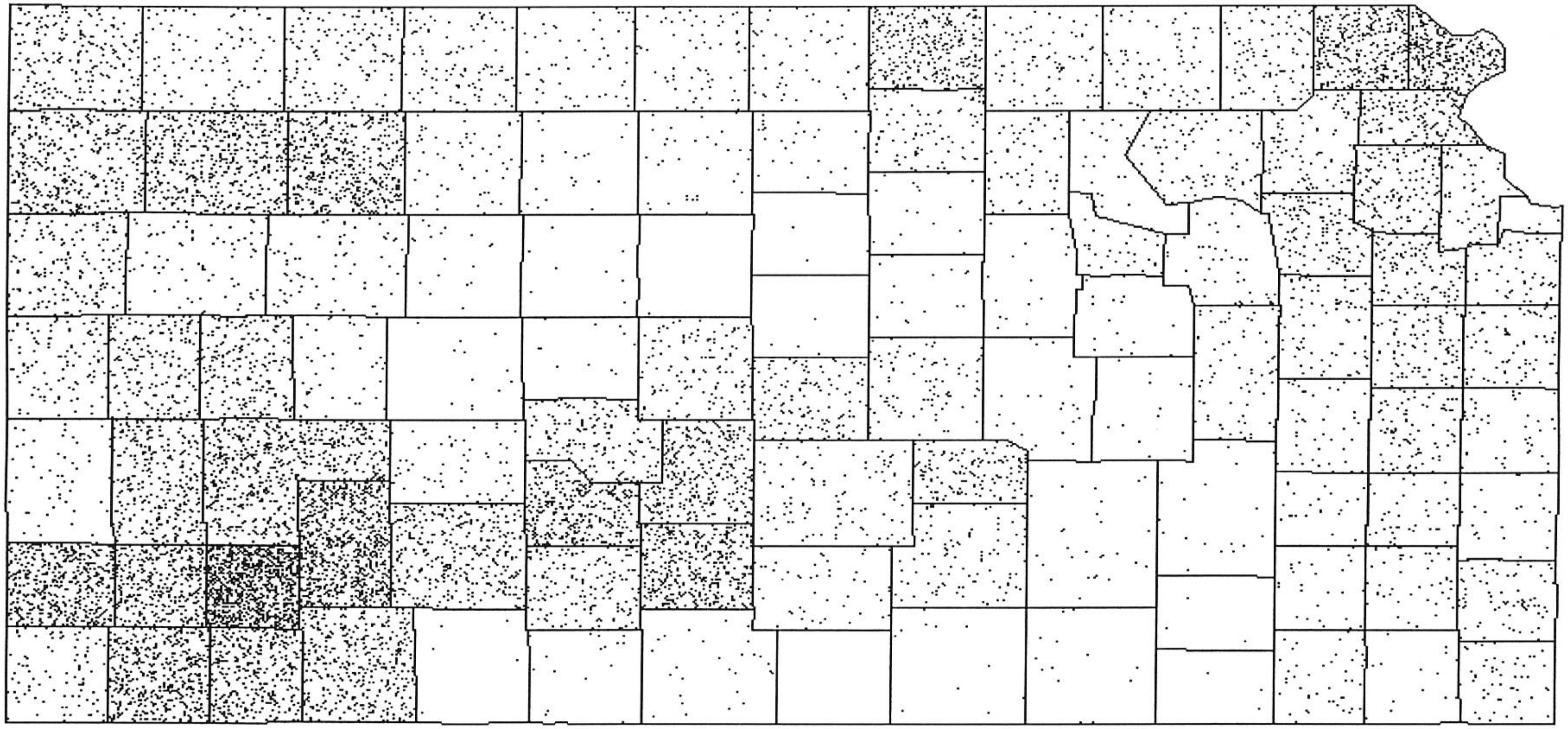
- Close proximity to plant feedstocks.
- Rail access.
- Road access.
- Availability of utilities; electricity, natural gas, and water.
- Availability of a wastewater treatment plant.
- Close proximity to dried distillers grains markets.
- Access to labor.
- Access to ethanol markets.

NAS Production Data

District	Corn (bushels)	Sorghum (bushels)	Cattle On Feed (head)	Hogs (head)
NW	74,890,000	16,253,000	145,000	146,000
WC	34,090,000	28,042,000	430,000	99,000
SW	153,260,000	36,842,000	1,165,000	1,453,000
NC	25,545,000	52,577,000	60,000	577,000
C	10,025,000	41,651,000	115,000	162,000
SC	44,395,000	31,307,000	160,000	187,000
NE	46,490,000	23,856,000	15,000	404,000
EC	22,035,000	13,122,000	30,000	199,000
SE	7,860,000	20,350,000	40,000	226,000
STATE TOTAL	418,950 (000)	264,000 (000)	2,160 (000)	3,453 (000)

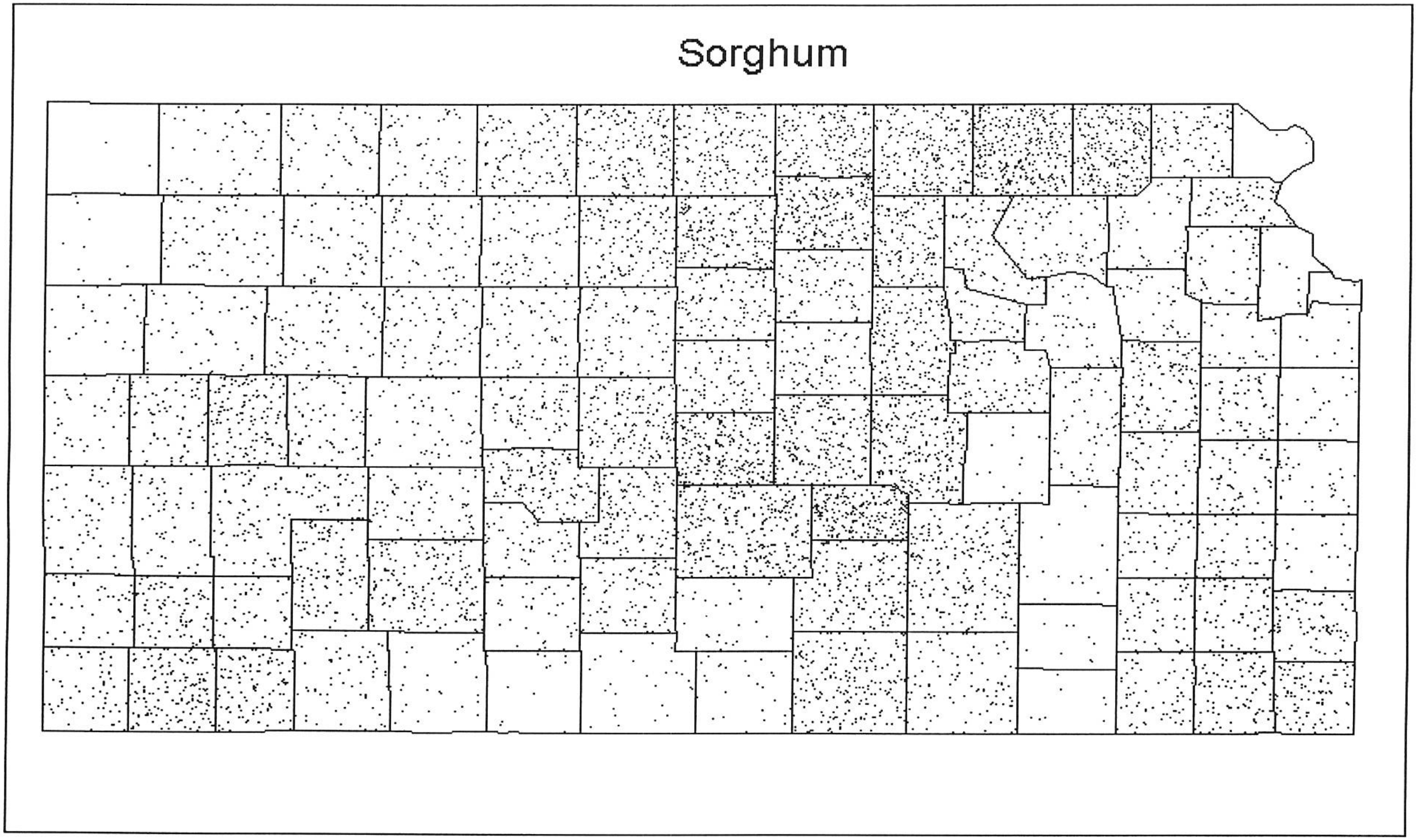
1-7

Corn



1 Dot = 15,000 Bushels

1-8

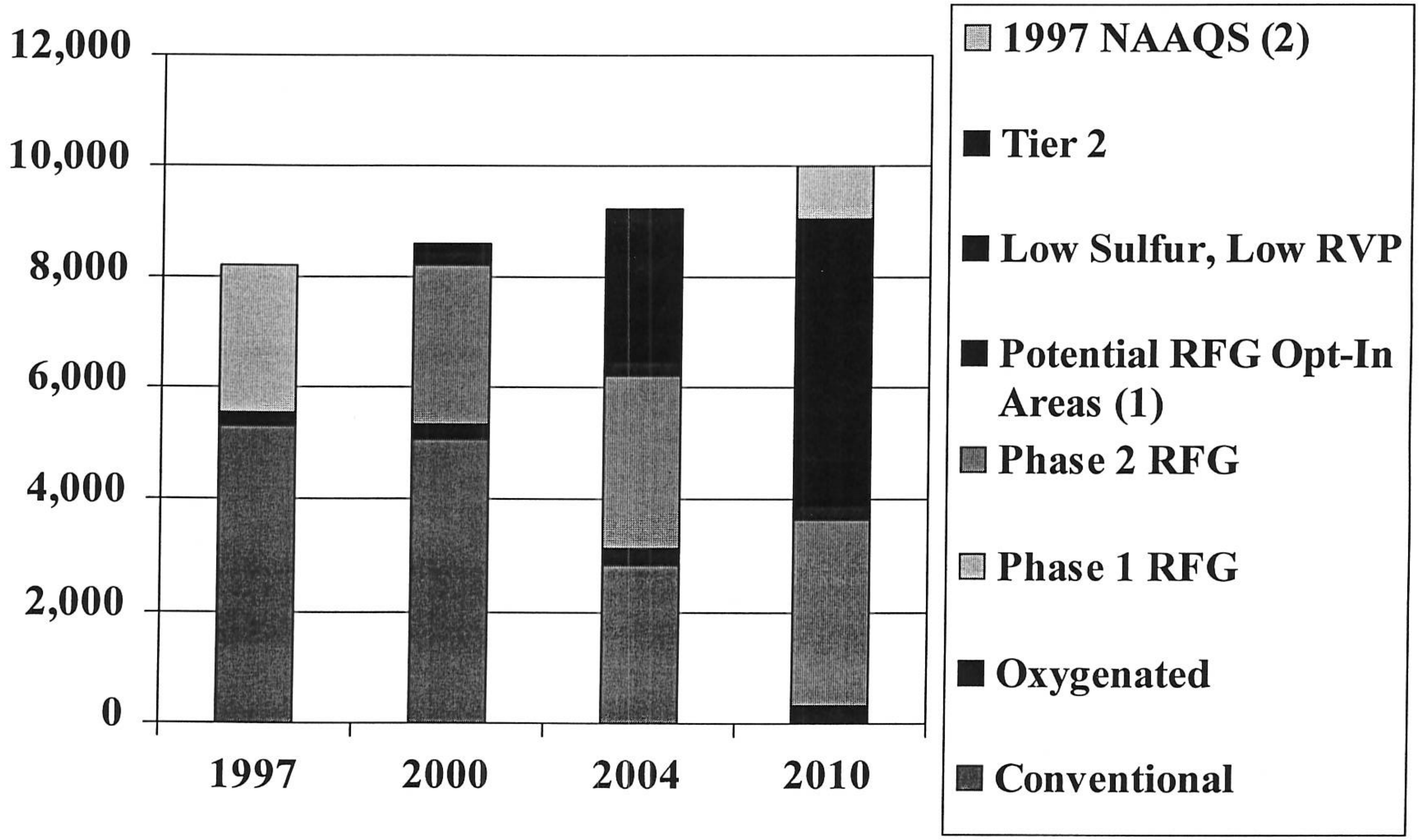


Sorghum

1 Dot = 15,000 Bushels

Projected US Gasoline Usage

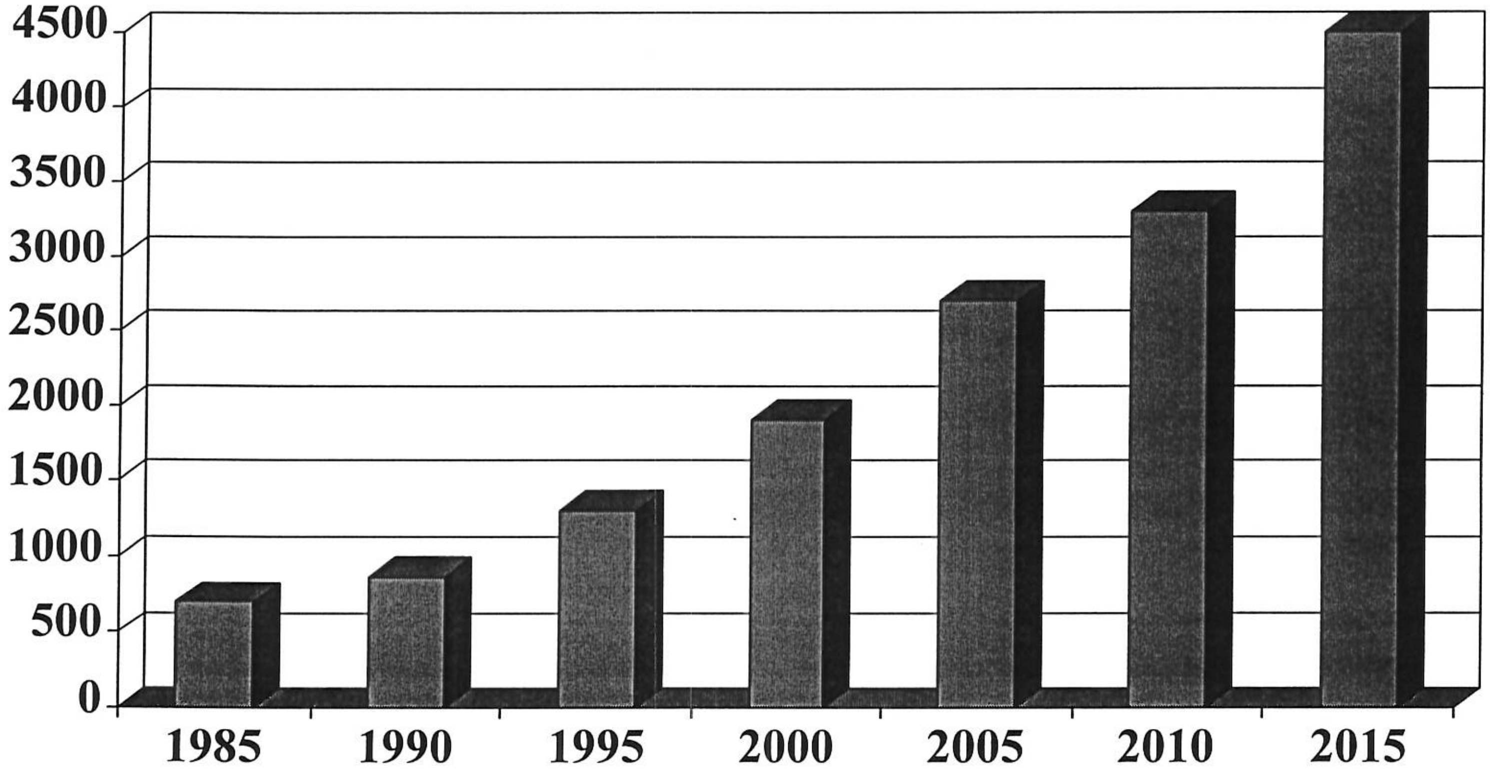
in thousands of barrels per day



1-10

US Ethanol Demand

in thousands of gallons



Source: Energy Information Administration

ASSUMPTION TEMPLATE FOR AN ETHANOL PLANT

(PER MILLION GALLONS OF PRODUCTION)

Inputs

- 1,875,000 gallons of fresh water
- 374,532 bushels of corn/sorghum
  (based on a 2.67 conversion factor)
- 1,162,500 KwH of electricity
- 44,875 MCF of natural gas

1-18

ASSUMPTION TEMPLATE FOR AN ETHANOL PLANT

(PER MILLION GALLONS OF PRODUCTION)

Outputs

- 1,050,000 gallons of 198+ proof denatured ethanol
- 3,090 tons of Distillers Dried Grains with Solubles (DDGS)

1-13

ASSUMPTION TEMPLATE FOR AN ETHANOL PLANT

(PER MILLION GALLONS OF PRODUCTION)

Transportation Statistics

- Incoming
  - 468 truckloads of corn/sorghum
- Outgoing
  - 125 truckloads of ethanol or 33 railcars
  - 103 truckloads of DDGS or 39 railcars

G A O
Accountability * Integrity * Reliability

United States General Accounting Office
Washington, DC 20548

Resources, Community, and
Economic Development Division

B-286311

September 25, 2000

The Honorable Tom Harkin
Ranking Minority Member
Committee on Agriculture,
  Nutrition, and Forestry
United States Senate

Subject: Petroleum and Ethanol Fuels: Tax Incentives and Related GAO Work

Dear Senator Harkin:

Over the years, the federal government has granted tax incentives, direct subsidies, and other support to the petroleum industry, as well as some tax and other benefits to the ethanol industry, in an effort to enhance U.S. energy supplies. The tax incentives generally decrease revenues accruing to the U.S. Treasury. In earlier reports, we addressed various issues related to these incentives, including their impact on federal revenues and effectiveness in accomplishing their objectives.

You requested that we provide you with information on the tax incentives[1] that benefit the petroleum and ethanol[2] industries. Accordingly, we are providing revenue loss estimates for tax incentives designed to encourage the exploration and production of petroleum and the production of ethanol (see enc. I). In addition to this specific information, we are providing a summary of key findings from our earlier reports on these and related issues (see enc. II). We used the enclosed material to brief your staff on June 30, 2000. A summary of the tax incentive information follows.

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[1] Tax incentives are federal tax provisions that grant special tax relief designed to encourage certain kinds of behavior by taxpayers or to aid taxpayers in special circumstances. The revenue losses that result from these provisions--called tax expenditures--may, in effect, be viewed as spending channeled through the tax system. The Congressional Budget and Impoundment Control Act of 1974 requires that a list of tax expenditures be included in the budget. The act defines "tax expenditures" as "revenue losses attributable to provisions of Federal tax laws which allow a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability." Each year, estimates of tax expenditure revenue losses are prepared by the Department of the Treasury and by the staff of the Joint Committee on Taxation. According to the Committee, these special income tax provisions are referred to as tax expenditures because they may be considered as analogous to direct outlay programs, and the provisions and programs can be considered as alternative means of accomplishing similar budget policy objectives.

[2] Under the Internal Revenue Code, a tax exemption and/or tax credits are available for any biomass-derived alcohol fuel, including ethanol and methanol. However, alcohol fuel derived from petroleum or natural gas does not qualify for the exemption or the credits.

Senate Agriculture Committee
Date 2-07-01
Attachment # 2-1 thru 2-3

Table 1 shows inflation-adjusted summations of estimated revenue losses for petroleum and ethanol fuel tax incentives from 1968 to 2000. We developed these data from unadjusted annual revenue loss estimates made by the Department of the Treasury and the staff of the Joint Committee on Taxation (JCT).[3] Specific petroleum tax incentives range from about $330 million for the expensing of tertiary injectants[4] (1980-2000) to about $82 billion for certain cost depletion deductions (1968-2000). Some of the tax incentives for the petroleum industry have been in place for many decades, but over the past 25 years, these incentives have generally been scaled back.

Table 1: Tax Incentives for Petroleum and Ethanol Fuels: Estimates of Revenue Losses Over Time

Dollars in millions

Tax incentive	Summed over years	Adjusted to year 2000 dollars
Petroleum industry		
Excess of percentage over cost depletion[a]	1968-2000	$81,679-$82,085
Expensing of exploration and development costs[a]	1968-2000	42,855-54,580
Alternative (nonconventional) fuel production credit	1980-2000	8,411-10,542
Oil and gas exception from passive loss limitation	1988-2000	1,065[b]
Credit for enhanced oil recovery costs	1994-2000	482-1,002
Expensing of tertiary injectants	1980-2000	330[c]
Ethanol industry		
Partial exemption from the excise tax for alcohol fuels	1979-2000	7,523-11,183
Income tax credits for alcohol fuels	1980-2000	198-478

Note: When two figures are provided for an incentive, they represent the estimates developed from Treasury's and JCT's data. The lower figure is presented first, regardless of which agency's data it is based on. Some of the estimated revenue losses for the tax incentives have a considerable range because of, among other things, (1) differences between Treasury's and JCT's estimates of individual and corporate gross income, deductions and expenditures, and (2) differences in the lower bound for the annual revenue loss estimates they present. See enclosure I for details.

[a] In some years, revenue losses associated with other fuels and nonfuel minerals were included with revenue losses from oil and gas. See enclosure I for details.

[b] There is no JCT revenue estimate because only Treasury recognizes this tax code provision as a separate tax incentive. See enclosure I for details.

[c] There is no Treasury revenue estimate because only JCT recognizes this tax code provision as a separate tax incentive. See enclosure I for details.

Source: GAO's compilations based on annual estimates of tax expenditures published by Treasury and JCT.

Ethanol fuel tax incentives ranged from $198 million for alcohol fuel tax credits (1980-2000) to about $11 billion for the excise tax exemption for alcohol fuels (1979-2000). These tax incentives were instituted in 1979-80. In the past decade, these incentives have been extended, but the rates of exemption and credit have been reduced somewhat.

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[3] For each tax incentive, the years over which we report annual revenue loss estimates are limited to the years for which both Treasury and JCT made estimates. Thus, the first year is the first period for which revenue loss estimates are available from both Treasury and JCT; it may not be the year when the incentive was first implemented. Estimates include both corporate and individual income tax revenue losses except for the partial exemption from the excise tax for alcohol fuels, which represents revenue losses from the federal excise tax on gasoline.

[4] Tertiary injectants are fluids, gases, and other chemicals that are pumped into oil and gas reservoirs to extract reserves that cannot be extracted by conventional primary or secondary recovery techniques.

2-2

The estimated revenue losses for these tax incentives should not be added together. The estimate for each tax incentive is made independently of any other tax incentive, and the effect of making more than one change might be greater than or less than the sum of the changes. Enclosure I contains more detailed information on these estimates of revenue losses from the petroleum and ethanol tax incentives (see tables 2-9), as well as descriptions of the incentives and summaries of their legislative histories.

Scope and Methodology

To prepare the information for this report, we compiled Treasury's and JCT's yearly revenue loss estimates for tax incentives received by the petroleum and ethanol industries. Treasury's estimates are from annual editions of the *Budget of the United States Government*, Analytical Perspectives volume, Tax Expenditures section. JCT's estimates are from annual editions of the *Estimates of Federal Tax Expenditures*. To put the dollar amounts for different years on a comparable basis, we adjusted these estimates for inflation, using a fiscal year gross domestic product (GDP) deflator.[5] Descriptions of the tax incentives and their legislative histories are from JCT's *Present-Law Tax Rules Relating to Domestic Oil and Gas Exploration and Production and Description of H.R. 53 and H.R. 423* (JCX-8-99, Feb. 23, 1999) and the Senate Committee on the Budget's *Tax Expenditures: Compendium of Background Material on Individual Provisions* (Dec. 1996). Additionally, we reviewed and summarized previous GAO studies related to petroleum and ethanol tax incentives and other subsidy programs. We conducted our work from July through September 2000 in accordance with generally accepted government auditing standards.

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Unless you publicly announce its contents earlier, we plan no further distribution of this report until 14 days after the date of this letter. At that time, we will send copies to interested Members of Congress and make copies available to others on request.

If you have any questions about this report or need additional information, please call Daniel Haas or Godwin Agbara at (202) 512-3841.

Sincerely yours,

Jim Wells

Jim Wells
Director, Energy, Resources,
and Science Issues

Enclosures - 2

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[5] The deflator was obtained from the *Budget of the United States Government, Fiscal Year 2001*, Historical Tables volume, table 10.1.

2-3

How Much Energy Does It Take to Make a Gallon of Ethanol?

David Lorenz and David Morris

August 1995

One of the most controversial issues relating to ethanol is the question of what environmentalists call the "net energy" of ethanol production. Simply put, is more energy used to grow and process the raw material into ethanol than is contained in the ethanol itself?

In 1992, ILSR addressed this question. Our report, based on actual energy consumption data from farmers and ethanol plant operators, was widely disseminated and its methodology has been imitated by a number of other researchers. This paper updates the data in that original report and addresses some of the concerns that some reviewers of the original report expressed.

Our analysis again concludes that the production of ethanol from corn is a positive net energy generator. Indeed, the numbers look even more attractive now than they did in 1992. More energy is contained in the ethanol and the other by-products of corn processing than is used to grow the corn and convert it into ethanol and by-products. If corn farmers use state-of-the-art, energy efficient farming techniques and ethanol plants integrate state-of-the-art production processes, then the amount of energy contained in a gallon of ethanol and the other by-products is more than twice the energy used to grow the corn and convert it into ethanol.

As the ethanol industry expands, it may increasingly rely on more abundant and potentially lower-cost cellulosic crops (i.e. fast growing trees, grasses, etc.). When that occurs, the net energy of producing ethanol will become even more attractive.

Three subordinate questions must be addressed to estimate the energy inputs and outputs involved in making ethanol.

1. How much energy is used to grow the raw material?
2. How much energy is used to manufacture the ethanol?
3. How do we allocate the energy used in steps one and two between ethanol and the other co-products produced from the raw material?

Answers to these three questions are presented in Table 1, which is divided into three sections that parallel the three questions: feedstock energy; processing energy; co-product energy credits. All energy inputs and outputs in this report are on a high heat value basis.[1]

Senate Agriculture Committee
Date 2-07-01
Attachment # 3-1 thru 3-11

Table 1:Energy Used to Make Ethanol From Corn and Cellulose (Btus per Gallon of Ethanol)

	Corn Ethanol (Industry Average)	Corn Ethanol (Industry Best)	Corn Ethanol (State-of-the-Art)	Cellulosic Crop-Based Ethanol
Fertilizer	12,981	7,542	3,869	3,549
Pesticide	1,060	643	406	437
Fuel	2,651	1,565	1,321	8,120
Irrigation	7,046	6,624	6,046	--
Other (Feedstock)	3,395	3,248	3,122	2,558
Total (feedstock)	*27,134*	*19,622*	*14,765*	*14,663*
Process Steam	36,732	28,201	26,185	49,075
Electricity	14,444	7,300	5,148	8,925
Bulk Transport	1,330	1,100	800	1,330
Other (process)	1,450	1,282	1,050	2,100
Total (processing)	*53,956*	*37,883*	*33,183*	*61,430*
TOTAL ENERGY INPUT	**81,090**	**57,504**	**47,948**	**76,093**
Energy in Ethanol	84,100	84,100	84,100	84,100
Co-product Credits	27,579	36,261	36,261	115,400
TOTAL ENERGY OUTPUT	**111,679**	**120,361**	**120,361**	**199,500**
Net Energy Gain	30,589	62,857	72,413	123,407
Percent Gain	**38%**	**109%**	**151%**	**162%**

We focus on corn because corn accounts for over 90 percent of the current feedstock for ethanol production in the U.S. and because corn-derived ethanol has been at the center of the controversy about the energetics of ethanol.

The data in Table 1 are presented from four different perspectives:

> The first column presents the energetics of ethanol based on the current energy efficiency of corn farming and ethanol production. Assuming the national average for energy used in growing corn and for energy used in the manufacture of ethanol, about 36,732 more BTUs, or 38 percent more energy is contained in the ethanol and other products produced in the corn processing facility than is used to grow the corn and make the products. In other words, the net energy ratio is 1.38:1.

The second column presents the energetics of ethanol based on the assumption that the corn is grown in the state with the most efficient corn farmers and the ethanol is made in the most energy efficient existing ethanol production facility. In this case, over two BTUs of energy are produced for every one BTU of energy used. The net energy ratio is 2.09:1.

The third column presents the energetics of ethanol based on the assumption that corn farmers and ethanol facilities use state-of-the-art practices. This is a best-case and hypothetical scenario. If farmers and industry were to use all the best technologies and practices the net energy ratio would be 2.51:1.

The data for the first three columns has been gathered from actual farming and ethanol production facilities. The data in the fourth column on the energetics of cellulosic crop-derived ethanol is more hypothetical since as yet no ethanol produced on a commercial scale is from cellulose. Feedstock production data assumes that a short rotation woody crop, such as a hybrid poplar, is used and processing energy data is taken from biomass-based ethanol facilities in the planning stages. The net energy ratio is 2.62:1.[2]

The reader can "mix and match" components from Table 1. For example, if an average efficiency corn farm provided the feedstock for the most efficient ethanol plant, the entire process would use 27,134 BTUs in the growing of corn plus 37,883 BTUs for the processing into various products for a total of 65,017 BTUs. With the lower co-product credits of 27,579 BTUs in column one, the total energy output would be 111,679 BTUs and the net energy increase is thus 46,662 BTUs. In this case the energy output/input ratio comes to 1.72.

1. How much energy is used to grow the corn?

This is a complicated question because of the wide variations in farming practices and farming conditions. Corn is grown in a variety of ways and in a variety of climatic and soil conditions. All of these affect the amounts and kinds of energy used.

For example, the single largest component of on-farm use is for nitrogen fertilizer, representing about 40 percent of all energy used in corn planting, cultivation and harvesting. The use of nitrogen fertilizer varies dramatically. Corn planted in rotation with soybeans or other legumes uses much less fertilizer than corn grown continuously.[3]

Corn farmers nationwide make 1.3-2.2 applications of nitrogen per year. Those who monitor the existing nitrogen in the soil before additional applications are able to reduce nitrogen fertilizer rates by up to 25 percent without affecting yields.[4]

The National Research Council notes, "Within a given region for a specific crop, average production cost per unit of output on the most efficient farms are typically 25 percent less, and often more than 50 percent less, than the average cost on less efficient farms." The study concluded that in 1987 the most efficient Minnesota corn farms used about 40 percent less fertilizer and pesticide per bushel than the least efficient farm.[5]

A Missouri study of 1,000 farms concluded that a 40 percent reduction in nitrogen applications is possible even among farmers using corn/soybean rotation systems if they adopt alternative growing techniques.[6]

Large farms tend to use continuous corn planting and higher nitrogen fertilizer applications. Smaller farm operations tend to rotate corn and soybeans or other legumes, lowering nitrogen fertilizer applications. From year to year large variations might occur even on the same farm due to weather conditions. Pennsylvania nitrogen fertilizer use, for example, ranged from 113 pounds per acre in 1988 to over 140 pounds in 1989 and 1990 to 76 pounds in 1993.

Our conclusions related to on-farm energy use are contained in Table 2, Agricultural Energy Use for Corn Production in the United States. This Table is the basis for the Feedstock Production data in Table 1.

Table 2: Agricultural Energy Use for Corn Production in the United States

		Average(National)			Best Existing(State)			State of te Art (Farmer)	
	lbs/acre (corn)	BTU/acre (corn)	BTU/gal (ethanol)	lbs/acre (corn)	BTU/acre (corn)	BTU/gal (ethanol)	lbs/acre (corn)	BTU/acre (corn)	(
Nitrogen	123	3,395,415	11,096	73	2,015,165	6,459	38	1,048,990	
Phosphorus	47	289,990	948	37	228,290	732	15	92,550	
Potash	55	286,825	937	21	109,515	351	17	88,655	
Pesticide	3	324,512	1,060	1.92	200,668	643	1.2	129,246	
Fuel	5.85 (gal.)	811,337	2,651	3.52 (gal.)	488,189	1,565	3.03 (gal.)	420,231	
Irrigation	-	2,156,200	7,046	-	2,026,828	6,624	-	1,850,020	
Other	-	1,038,790	3,395	-	1,013,527	3,248	-	992,947	
Total Energy	-	8,303,069	27,134	-	6,082,182	19,622	-	4,622,638	

The national average for nitrogen fertilizer application for corn production from 1991-1993 was on average 123 pounds per acre[7]. South Dakota farmers used the least amount. South Dakota is the ninth largest producer of corn in the United States with a 1991 production of 240.5 million bushels. The state has approximately 20,000 mostly small farms that primarily rely on corn/soybean rotations. South Dakota has traditionally been below the national average in nitrogen fertilizer application. In 1989 it used 131 pounds per acre, dropping to 71 pounds in 1991 and 70 pounds in 1993.

Aside from fertilizers, energy is used for farm vehicles and for crop drying, seed corn production, on-farm electricity, bulk crop transportation and for crop irrigation. The use of irrigation, in particular, makes a significant difference in the energetics of corn. Only 16 percent of all corn grown in the U.S. comes from irrigated farms. Thus, in the first column of Table 1 under "Irrigation" we have assigned a weighted average of 16 percent in our calculations.[8] The average farm uses about 5.85 gallons of diesel fuel per acre. Estimates for best-existing fuel consumption are based on no-till cultivation techniques.

The state-of-the-art column assumes that farmers use low input agricultural practices and new hybrid varieties, like Pioneer Hi-Bred International's new tropical corn.

Although the state of the art column is intended to represent a hypothetical best-case, we have identified at least one farmer who has already achieved similar results. Since 1987, the Thompson farm located in Central Iowa, has been using 35 percent less energy than the national average, while achieving yields 30 percent above the national average. Its total energy input is about 5 million BTUs per acre of corn compared to our state-of-the-art estimate of 4.6 million BTUs and the national average of 8.4 million BTUs. Translated into energy input per gallon of ethanol, the Thompson farm contributes about 16,800 BTUs per gallon of ethanol produced compared to our State-of-the-Art figures of 14,800 BTUs per gallon.[9]

Our conclusion is that, for corn production, farmers use 27,134 BTUs per gallon of ethanol. The most energy-efficient farms use 19,622 BTUs while the state-of-the-art is 14,764 BTUs per gallon. For comparative purposes, we also include the energy used to raise hybrid poplar, 14,663 BTUs per gallon of ethanol produced.

2. How much energy is used to make the ethanol?

The data in Table 1 for ethanol production are contained in the section titled Processing Energy Input. They are based on the weighted average of both wet and dry milling operations that produce at least 10 million gallons per year.[10] Table 3 presents these energy requirements for both wet and dry mills. The data is taken from actual plant operations as of early 1995.

Table 3: Ethanol Processing Energy Use for Wet and Dry Mills

	Average(National)		Best		State of te

			Existing(State)		Art (Farmer)	
	Wet Mill (BTU/gal)	Dry Mill (BTU/gal)	Wet Mill (BTU/gal)	Dry Mill (BTU/gal)	Wet Mill (BTU/gal)	Dry Mill (BTU/gal)
Process Steam	35,400	39,000	29,200	26,500	26,000	26,500
Electricity	17,103 (2.07 kWh)	9,915 (1.2 kWh)	8,676 (1.05 kWh)	4,957 (0.6 kWh)	5,872 (0.9 kWh)	3,915 (0.6 kWh)
Bulk Transport	1,330	1,330	1,100	1,100	800	800
Other (process)	1,450	1,450	1,282	1,282	1,050	1,050
Processing Total	55,283	51,695	40,258	33,839	33,722	32,265

The modern motor fuel grade ethanol industry is only 18 years old. Early plants were very inefficient. Indeed, in 1980 a typical ethanol plant all by itself consumed more energy than was contained in a gallon of ethanol. Some plants used as much as 120,000 BTUs to produce a gallon of ethanol that contained only 84,100 BTUs of energy.

In the last decade many ethanol plants have become much more energy efficient. In 1980, for example, ethanol plants used 2.5 to 4.0 kWh of electricity per gallon of ethanol produced. Today they use as little as 0.6 kWh. The majority of ethanol producers still purchase electricity from outside sources, but newer facilities generate electricity from process steam within the plant.

In the late 1970s, ethanol plants did not recover waste heat. Today they do. Old energy intensive rectification and solvent extraction systems required 12,000 BTUs per gallon of ethanol produced. Newer molecular sieves need only 500 BTUs.11 Larger producers have been using molecular sieves for several years. Now smaller plants (20 million gallons per year and less) are starting to incorporate them.

Best-existing and state-of-the-art ethanol plants can achieve energy reductions through a combination of these technological innovations. Molecular sieves reduce distillation energy significantly; low cost cogeneration facilities produce process steam and electricity; and semi-permeable membranes efficiently remove co-products from the process water to reduce the energy requirements of drying.

Wet mills, which account for 63 percent of all ethanol currently produced, extract higher value co-products than dry mills. Co-products from wet mills include corn oil, 21 percent protein feed, 60 percent gluten meal, germ, and several grades of refined starches and corn sweeteners. In dry milling, co-products can include corn oil and distillers dry grain with solubles (DDGS), which is used as animal feed. Carbon dioxide is a fermentation by-product of both milling processes.

Dry mills derive the DDGS co-product from the process water after fermentation occurs. It then requires a significant amount of energy to dry this co-product into a saleable form. Wet mills derive the majority of the co-products before fermentation through mechanical separators, centrifuges, and screens. All told, wet mills require 60 percent more electrical energy than dry mills on average, while requiring 10 percent less thermal energy. These differences are related specifically to the processing of the co-products, and are illustrated in the "Average" column in Table 3.

An integrated, relatively small-scale dry mill could avoid drying energy requirements for co-products. Reeve Agri-Energy in Garden City, Kansas, operates a 10 million gallon per year plant that feeds wet DDGS to its cattle. This operation uses only about 33,000 BTUs to produce a gallon of ethanol. However, a limited number of locations exist with a sufficient number of nearby livestock to justify such an operation, and it would probably not be economical for larger dry milling operations to adopt such practices.

A wider number of wet mills, on the other hand, may be able to achieve the energy use levels noted in the best existing wet mill category in Table 3.

We conclude that the ethanol industry, on average, uses 53,956 BTUs per gallon to manufacture ethanol. The best existing plants use 37,883 BTUs per gallon. Next generation plants will require only 33,183 BTUs per gallon of ethanol produced.

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3. How do we divide the energy used among the products produced?

If we add the amount of energy currently used in growing corn on the average farm to the amount of energy used to make ethanol in the average processing plant today, the total is 81,090 BTUs per gallon (Table 1, Column 1). Under the best-existing practices, the amount of energy used to grow the corn and convert it into ethanol is 57,504 BTUs per gallon. Ethanol itself contains 84,100 BTUs per gallon. Thus even without taking into account the energy used to make co-products, ethanol is a net energy generator.

But an analysis that excludes co-product energy credits is inappropriate. The same energy used to grow the corn and much of the energy used to process the corn into ethanol is used to make other products as well. Consequently, we need to allocate the energy used in the cultivation and production process over a variety of products. This can be done in several ways.

One is by taking the actual energy content of the co-products to estimate the energy credit. For example, 21 percent protein feed has a calorie content of 16,388 BTUs per pound. The problem with this method is that it puts a fuel value on what is a food and thus undermines the true value of the product.

Another way to assign an energy value to co-products is based on their market value. This is done by adding up the market value, in dollars, of all the products from corn processing, including ethanol, and then allocating energy credits based on each product's proportion of the total market value. For example, Table 4 shows the material balance and energy allocation based on market value for a typical wet milling process. Here the various co-products account for 43 percent of the total value derived from a bushel of corn, and thus are given an energy credit of 36,261 BTUs per gallon of ethanol.

Table 4: Market Value Method for Allocating Energy for Corn Wet Milling (1 bushel=52 pounds)

Products	Amount Produced (pounds)	Market Value (dollars per pound)	Total Value(dollars)	Energy Allocation (BTUs per gallon ethanol)
Corn Oil	1.6	$0.35	$0.58	9,010
21% Gluten Feed	13.5	$0.05	$0.68	10,563
60% Gluten Meal	2.6	$0.12	$0.31	4,816
Carbon dioxide	17	$0.04	$0.68	10,563
Total Co-Products	34.7	-	$2.25	34,953
Ethanol	16.5	$0.18	$2.97	46,137
Total Products	51.2	-	$5.22	81,090

The replacement value method is a third way to determine co-product energy credits. Using this approach, we determine the nearest competitor to corn products and calculate how much energy it would require to raise the feedstock and process it into that product. For example, it requires 1.6 pounds of soybean oil to replace 1.6 pounds of corn oil. The energy required to raise the soybeans and extract the oil comes to 13,105 BTUs. The nearest feeding equivalent to the 13.5 pounds of 21 percent corn protein feed is 13.45 pounds of barley. The energy required for growing the barley and drying it is 1,816 BTUs per pound, which translates into 7,188 BTUs per gallon of ethanol equivalent. The carbon dioxide replacement value is based on the energy intensity of other fermentation processes that produce it as a by-product. Carbon dioxide has no actual energy value because it is not classified as a food (caloric value) or a fuel (combustion value). However, the majority of the carbon dioxide produced in ethanol fermentation is captured and sold, and it is therefore necessary to include this co-product energy credit.

Table 5 provides a comparative overview of all three methodologies. The first two rows are based on corn products. The third row is based on non-corn equivalents. The last column in Table 5 shows the variation depending on which methodology is used. For Table 1 we chose to use the replacement value energy estimates, which come to 27,579 BTUs per gallon.

Table 5: Co-Product Energy Credit Methodologies for Corn Wet Milling

Method	Corn Oil	60% Gluten Meal	21% Protein Feed	Carbon Dioxide	Total Co-Products
Actual Energy Value	9,960	3,404	16,388	-	29,752
Market Energy Value	9,347	4,996	10,959	10,959	36,261
Replacement Value	13,105	2,827	7,187	4,460	27,579

We have chosen a higher value of 36,261 BTUs per gallon for the best-existing and state-of-the-art cases. Each of the co-products produced with ethanol competes with and replaces a variety of alternate products. For example, 21 percent corn protein meal competes with conventional feed products like hay, grain straw, soybean protein, barley, etc, many of which are not clearly defined in terms of energy value. Currently 21 percent corn protein competes with all of these and partially replaces all of them. If it were to completely replace barley alone, it would have a higher energy credit. The higher energy credits in the second and third columns of Table 1 are based on analyses of potential products that have a higher energy replacement value and that are currently only partially replaced by corn-ethanol co-products.

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4. Conclusion

Assuming an average efficiency corn farm and an average efficiency ethanol plant, the total energy used in growing the corn and processing it into ethanol and other products is 81,090 BTUs. Ethanol contains 84,100 BTUs per gallon and the replacement energy value for the other co-products is 27,579 BTUs. Thus, the total energy output is 111,679 BTUs and the net energy gain is 30,589 BTUs for an energy output-input ratio of 1.38:1.

In best-existing operations, assuming the corn is grown on the most energy efficient farms and the ethanol is produced in the most energy efficient plants, the net energy gain would be almost 58,000 BTUs for a net energy ratio of 2.09:1. Assuming state-of-the-art practices, the net energy ratio could be as much as 2.51:1. Cellulosic crops, based on current data, would have a net energy ratio of 2.62:1.

There are circumstances where ethanol production would not generate a positive energy balance. For example, one could assume corn raised by the least energy efficient farmers, those who use continuous corn planting and irrigation, being processed by ethanol plants that do not use cogeneration and other energy efficient processes. In this case ethanol production could have a negative energy balance of about 0.7:1. However, a relatively small amount of ethanol is produced in this manner, possibly less than 5 percent. We think it reasonable to look at least to columns one and two for the answer to our initial question. Based on industry averages, far less energy is used to grow corn and make ethanol than is contained in the ethanol. Moreover, we think it is a safe assumption that as the ethanol market expands, new facilities will tend to incorporate state-of-the-art processing technologies and techniques so that each new plant is more energy efficient than the one before. It is less certain that farmers will continue to become more energy efficient in their operations because of the many variables involved. Nevertheless, it does appear that growing numbers of farmers are reducing their farm inputs and that this trend will continue.

A final word about cellulose. If annual ethanol sales expand beyond 2 billion gallons, cellulosic crops, not starch, will probably become the feedstock of choice. The data in the last column suggest a very large energy gain from converting cellulosic crops into ethanol. Cellulosic crops, like fast growing tree plantations, use relatively little fertilizer and use less energy in harvesting than annual row crops. The crop itself is burned to provide energy for the manufacture of ethanol and other co-products. A major co-product of cellulosic crops is lignin, which currently is used only for fuel but which potentially has a high chemical value. Were it to be processed for chemical markets, the net energy gain would be even greater.

Our conclusion is that under the vast majority of conditions, the amount of energy contained in ethanol is significantly greater than the amount of energy used to make ethanol, even if the raw material used is corn.

NOTES

1 The difference between high and low heat values represents the heat contribution of the condensation of water during combustion. When ethanol is burned, for example, it produces heat and water vapor. As the water vapor condenses it gives off additional heat. Ethanol has a low heat value(LHV) of 76,000 BTUs/gallon, an estimate which more accurately represents the heat content of the fuel in conventional combustion engines. Ethanol has a high heat value of 84,000 BTUs/gallon. In the United States the energy content of fuels conventionally is expressed on a high heat value(HHV) basis. Interestingly, in Europe LHVs are used. The use of either basis does not affect the conclusions of our analysis such as long as the same heat values are used for all inputs and outputs.

2 The estimate of the net energy gain from cellulosic crop-based ethanol is considered conservative. We believe that as this industry develops, the same learning curve that occurred in the starch based ethanol industry will occur in the cellulosic based ethanol industry, fostering a much more positive net energy gain for ethanol production from cellulose.

3 Agriculture Chemical Usage: Field Crops Summary. U.S. Department of Agriculture. Economic Research Service. Washington, D.C. 1992-1994.

4 Bosch, D. J., K. O. Fuglie, and R. W. Keim, Economic and Environmental Effects of Nitrogen Testing for Fertilizer Management, U.S. Department of Agriculture, Economic Research Service, 1994.

5 Alternative Agriculture. Committee on the Role of Alternative Farming Methods in Modern Production Agriculture. Board on Agriculture. National Research Council. National Academy Press. Washington, D.C. 1989.

6 Research conducted by the Department of Agricultural Economics. University of Missouri-Columbia, Columbia, Missouri.

7 Testing indicates that one acre of corn absorbs approximately 90 lbs of nitrogen fertilizer in one growing season. All of the estimates for fertilizer usage in this report assume synthetic fertilizer inputs. The difference between corn's nitrogen requirements and the fertilizer requirements indicated represent the reductions possible via the alternative growing strategies mentioned specifically in the text. These include rotations with leguminous crops, and the use of naturally occurring forms of nitrogen, such as animal waste.

8 Previous studies have included other components in the on-farm analysis. One included the amount of solar energy used in photosynthesis. Another included the embodied energy of farm machinery, that is, the energy used to make the machinery. We have decided not to include energy inputs which are acquired at no cost, like sunlight. Also we have not included embodied energy because the estimates are subject to a very high degree of uncertainty.

9 Personal conversation with Richard Thompson, November, 1992.

10 About 95 percent of the motor fuel grade ethanol in the United States is produced from 10 million gallon per year facilities or larger. Although there are a number of facilities of smaller scale, the vast majority of those will quickly expand production, if commercially successful.

11 DeSplegelaere, T.J. "Energy Consumption in Fuel Ethanol Production for a Corn Wet-Milling Process", paper presented at IBIS 1992 Fuel Ethanol Workshop. Wichita, Kansas. June 9-11, 1992.

How Much Energy Does It Take to Make a Gallon of Ethanol? can be ordered from ILSR's Washington, DC office. Cost of the hard copy is $8.75 including shipping and handling.

Institute for Local Self-Reliance, National Office
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Westphalia, KS 66093
785-489-2413

Statement to Senate Agriculture Committee
February 7, 2001

1. Introduction

2. Operation – 3000 acres of row crop. 275 head of mother cows. Since Freedom to Farm, we have rotated out of wheat to 40% feed grain & 55% beans.

3. Eastern Kansas Agri Energy (EKAE) is currently a group of 47 producers and agribusiness people from Anderson County and the surrounding area. The Anderson County Economic Development (ACED) committee had a pre-feasibility study done that showed a lot of promise for a ethanol plant to be built in our area. We have toured two plants in Missouri. Both of these groups stressed the importance of State funded incentives for the profitability of these plants. In Missouri, they receive 20 cents per gallon for first 12 ½ million gallons, after that they receive 5 cents per gallon for second 12 ½ million gallons. There were no ethanol plants built in Missouri until State funded incentives were in place.

4. In our part of Kansas, we haven't had a good crop year since 1998. The fact that 47 people have invested $1000 each of at-risk money to finish the feasibility study and have some start up monies says a lot about their desire to add value to the crops that we produce. We are going to have to try to implement these things ourselves because the marketplace is not doing that.

5. In conclusion, an ethanol plant will add about 30 good jobs to our community. It will also add a source of livestock feed to area producers which might expand cattle and dairy operations, which in turn would also help the area. We would also see a 5 to 10 cent increase in feed grain prices in our area if this plant was built. Those who invest in a successful plant would also receive a better return on their investment than they can by investing in farm land.

Senate Agriculture Committee
Date 2-0701
Attachment # 4-

K-STATE
Kansas State University
Cooperative Extension Service
K-State Research and Extension
Anderson County
411 South Oak
P.O. Box 423
Garnett, KS 66032 -0423
785-448-6826

Statement of Jill A. Zimmerman
K-State Research and Extension
Anderson County Extension Agent,
Agriculture

February 7, 2001

Senate Agriculture Committee

County Extension Agents throughout the state of Kansas are viewed as leaders and role models of their community. It is extremely important, as agents, that we are cognizant of issues affecting agriculture. Especially, in a rural community such as ours, where our livelihood depends upon production agriculture.

Often times we are a source of research based information for our clientele. This requires us to not only source the information but have the ability to facilitate this information to producers in a variety of ways. Whether it be hosting in-depth schools, offering producer programs, or various one-on-one consultations.

The agriculture industry is changing at a rapid pace and the importance of knowing what producers "needs" and "wants" are to help them remain competitive in the agriculture industry has never been as important as it is today.

My involvement began over a year ago when I was asked to serve on the Anderson County Economic Development(ACED) Committee. As chairperson of the agriculture sub-committee, it became our objective to look at opportunities to provide added value to agriculture in Anderson County. In ACED's process, we used the template provided by the two grain commissions and the Department of Commerce and Housing to complete our own pre-feasibility work before hiring Bryan and Bryan, Inc. of Cotopaxi, Co to complete a more in-depth pre-feasibility analysis.

Producers are also constantly seeking new ways to provide added value to the raw commodities that they produce. As is the case with formation of a 47 member producer alliance known as East Kansas Agri Energy (EKAE). Of which 34 producers are from Anderson County, and they have strongly demonstrated their interest in pursuing an ethanol production facility in eastern Kansas.

Through this process I have served as a source of information and facilitated opportunities for those individuals in our community to learn more about ethanol production and how an ethanol plant would affect our community. We have toured two new generation ethanol cooperatives in Missouri that have came on line within the last year.

It has become apparent through this process that there is a true need for a source of reliable, non-biased information and guidance regarding ethanol production in our state. Other states have that type of support base for individuals to draw upon. I State Research and Extension is working to develop that knowledge base utilized by those parties interested in pursuing ethanol production in their communities.

Senate Agriculture Committee
Date 2-07-01
Attachment # 5-1 thru 5-2

Anderson County
Kansas State University Agricultural Experiment Station and Cooperative Extension Service
K-State, County Extension Councils, Extension Districts, and U.S. Department of Agriculture Cooperating.
All educational programs and materials available without discrimination on the basis of race, color, religion, national origin,

The Anderson County project has been fortunate that ACED and producers had the vision to look at opportunities for value added agriculture and that they utilized resources available to them to expanded their knowledge base. Together we have teamed up with other projects throughout the state to pool resources, evaluate findings and share learned information.

The magnitude of this project has the potential to have a huge impact on agriculture in the state of Kansas. The interest, enthusiasm and eagerness to learn to learn that so many people across the state have demonstrated about ethanol is enormous. Thus, more people are becoming aware of what measures must be takes to make this type of project successful in our state. It is my belief that we are on the threshold of doing something that would have a positive impact for Kansas, agriculture and rural communities for many years to come

Ethanol Production Facility Report
McPherson-Rice County Area

An interesting blend of a large grain sorghum production area adjacent to a relatively large feedlot area gave encouragement to a group of farmers, feeders, and agri-businessmen to explore the feasibility of an ethanol plant in the McPherson-Rice county area. A six county area surrounding the Lyons or McPherson site annually produces about 32,000,000 bushels of grain sorghum which is largely exported out of the area. In addition, the presence of between 100-150,000 head of feedlot cattle creates an attractive target for utilization of the by-product, distillers grains.

The McPherson Chamber of Commerce agriculture committee, several area cooperatives, and a group of central Kansas feedlots have been working together intensively for five months now to study the economic feasibility of converting grain sorghum into a renewable fuel at the same time providing a very high quality concentrate product to cattle feeders.

The group has been working very closely with Kansas Department of Commerce and Housing, Kansas Cooperative Development Center, Kansas Grain Sorghum Commission, Kansas State University, and local K-State Research and Extension agents to gather as much information as possible to guide the decision making process.

Preliminary feasibility studies prepared in cooperation with David Coltrain, Extension ag economist, showed an ethanol production facility in this central Kansas area carried significant potential for being profitable largely due to two competitive advantages: (1) a nearby source of abundant grain sorghum which is priced discount to corn, and (2) nearby feedlots which could utilize the by-product on a 'wet' basis to avoid expensive natural gas drying costs. Other advantages for the area include shorter freight routes to certain metro markets, the possibility of establishing a 'co-generation' relationship with nearby industry, and adequate commercial grain storage already in place.

The exploration group recently took a tour of two ethanol plants near Hastings, Nebraska to get a better feel what all is involved in the establishment and management of an ethanol facility. Host plants were very cooperative and informative, giving our group even more encouragement to proceed. Consultations have also been held with several ethanol industry experts.

The next step will be to contract with a professional ethanol industry consultant to complete an in-depth feasibility study and business plan. Funds have been raised for this analysis through a combination of grants and local producer support. If this feasibility study proves positive, a more formal organizational structure will be set up to carry the project forward. The major hurdle will obviously be raising the capital it requires to construct and start-up any major agriculture value-added industry. Potential investors at this point would include area grain producers, feedlots, cooperatives, and, to an unknown extent, other outside investors.

The economic impact of an ethanol plant will reach not only grain farmers and feedlots, who will feel direct monetary benefits, but also the local communities where skille services and utilities purchased.

Prepared by Dale Ladd,

Senate Agriculture Committee
Date 2-07-01
Attachment # 6