STATE TAX INCENTIVES FOR THE NORTH DAKOTA ETHANOL INDUSTRY: ISSUES AND ALTERNATIVES

By

Daniel L. Zink

UGPTI Staff Paper No. 76
July 1986

STATE TAX INCENTIVES FOR THE NORTH DAKOTA ETHANOL INDUSTRY: ISSUES AND ALTERNATIVES

BY

DANIEL L. ZINK
RESEARCH ASSISTANT

UPPER GREAT PLAINS TRANSPORTATION INSTITUTE
NORTH DAKOTA STATE UNIVERSITY
P. O. BOX 5074
FARGO, NORTH DAKOTA 58105

in cooperation with the

NORTH DAKOTA STATE HIGHWAY DEPARTMENT
WALTER R. HJELLE, COMMISSIONER
AND
FEDERAL HIGHWAY ADMINISTRATION
U. S. DEPARTMENT OF TRANSPORTATION

JULY 1986

PREFACE

The production of ethanol from raw agricultural products and utilizaion of the fuel as an octane enhancer has taken on state and national significance. This is due to the growth in production and utilization of the product, and concurrent support of the industry through federal and state tax incentives.

This report is intended to provide background information from which decisions can be based regarding current and future tax incentives. The intent is to provide factual information without regard to position on the level or source of tax incentives or subsidies.

For further information regarding this report contact:

Daniel L. Zink
Transportation Economist
Upper Great Plains Transportation Institute
North Dakota State University
Fargo, North Dakota 58105
(701) 237-7767

Funding for this project was provided by the North Dakota State Highway Department, Walter R. Hjelle, Commissioner, in cooperation with the Federal Highway Administration, U.S. Department of Transportation.

TABLE OF CONTENTS

PREFACE

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

North Dakota's ethanol industry is new relative to most other states. However, the industry has drawn significant attention due to the absolute level of funds diverted from highway programs to support the ethanol industry.

Gasohol has grown to constitute a significant share of the total motor fuel market, accounting for approximately 20 percent of gasoline/gasohol sales in North Dakota. Nationally, gasohol has captured approximately eight percent of the market.

The current eight cent per gallon gasohol exemption, however, is a major benefit to the ethanol industry in that it allows producers to sell their product competitively with other fuels. Reducing or eliminating the exemption would have a negative impact on the ethanol industry.

The tax exemption for gasohol, however, has detracted from funds available to the Highway Distribution Fund. From this fund, monies are distributed to the State Highway Department, counties and cities for road construction and maintenance. These government jurisdictions, as well as users of the highway system, are concerned over their ability to maintain an effective program to provide adequate highway services to the public.

The fiscal impact of the exemption has only recently been felt because of the rapid increase in gasohol's market share and the reduction in the tax on gasohol to 5 cents per gallon (increase in exemption to 8 cents per gallon). The funds lost to the Highway Distribution Fund from the exemption are as follows:

Fiscal Year	Loss to Fund
1985	$0.5 million
1986	$4.6 million
1987 (proj.)	$5.5 million
1988 (proj.)	$2.7 million

For the subsequent years, the loss will depend on gallons consumed and gasohol's market share. But at projected 1988 gallonage and market share, the annual loss would be approximately $2.7 million per year until 1992 when gasohol is scheduled to be taxed the same as gasoline. The projected 1988 loss is lower primarily due to the scheduled reduction in the gasohol exemption from 8 to 4 cents on July 1, 1987.

Several alternatives are available for the future. These may include:

1. Leave exemption as it is.
2. Accelerate reduction of the exemption.
3. Eliminate the exemption.
4. Provide direct producer credit as an alternative to a gasohol tax exemption.
5. Increase motor fuel taxes to compensate for losses to the Highway Distribution Fund from the gasohol exemption.
6. Some combination of any of the above.

Each of these alternatives has positive or negative implications for different groups. Any reduction in the gasohol exemption will injure the ethanol industry. Retaining the exemption will

continue to divert funds from highway/street maintenance and construction. Tax increases may be difficult to pass given recent increases in 1983. Providing a direct credit to producers may not provide the same support as an exemption, and the problem of source of the funds still exists.

INTRODUCTION AND OBJECTIVES

The production of alcohol fuels from grains and other materials has taken place for many years. The topic gained national attention in the last decade due to dramatic changes in the U.S. and worldwide energy situation. Energy shortages and sharp increases in the price of energy, particularly oil, led to a thorough evaluation of the national energy policy in terms of supplies, prices and self-sufficiency. One result of this evaluation was the consideration of energy production from alternative sources, including grains.

Incentives were subsequently provided to promote the production of ethanol, an octane enhancer blended with gasoline to form gasohol. The incentives to produce ethanol came in the form of a tax exemption at the retail level to promote gasohol consumption. A federal tax exemption of 4 cents/gallon was first granted in 1978 and was increased to 5 cents/gallon in 1983 and to 6 cents in 1985. The total federal tax on gasoline not containing ethanol is currently 9 cents per gallon (Table 1). Funds collected through the federal gasoline tax go into the Federal Highway Trust Fund and are distributed nationally for a variety of highway-related programs.

TABLE 1. HISTORICAL FEDERAL MOTOR FUEL TAXES.

Year	Gasoline	Tax Gasohol	Diesel
	----------cents per gallon----------		
1932	1	-	-
1951	2	-	2
1956	3	-	3
1959	4	-	4
1978	4	0	4
1983	9	4	9
1984 (August)	9	4	15
1985 (January)	9	3	15

Source: Planning Division, North Dakota State Highway Department

Individual states, including North Dakota, have also implemented tax incentive programs, not necessarily as a means to support the national energy policy, but to promote and maintain economic development within their borders. North Dakota first provided its tax incentive program through a tax exemption at the retail level similar to the federal gasohol exemption. The exemption on gasohol currently stands at 8 cents per gallon in North Dakota and is scheduled to remain at that level until July 1987 when it will drop to 4 cents. It is scheduled to remain at 4 cents per gallon through December 1992 after which gasohol will be taxed the same as gasoline (Table 2).

TABLE 2. HISTORICAL AND PROJECTED STATE MOTOR FUEL TAXES IN NORTH DAKOTA.

Date	State Tax Per Gallon		
	Gasoline	Gasohol	Diesel
	----------cents per gallon----------		
1926	2	-	2
1929	3	-	3
1939	4	-	4
1951	5	-	5
1955	6	-	6
1970	7	-	7
1978	8	-	8
1979	8	4	8
1983	13	9	13
1984	13	8	13
1985 (January)	13	7	13
1985 (July)	13	5	13
----------(projected)----------			
1987 (July)	13	9	13
1992	13	13	13

Source: North Dakota State Highway Department

In addition to incentives for gasohol consumption provided in the tax exemption, a further boost to ethanol production has been provided by the Environmental Protection Agency program whereby lead utilization as an octane enhancer will be phased out to reduce environmental hazards. If and when the full effects of this phase out program are felt, it may provide additional demand for ethanol as an octane enhancer. Several methods are available to increase the octane level of gasoline, including the addition of lead or ethanol. Various methods of increasing octane levels

are utilized depending on the underlying economics of using each method, as well as applicable laws and regulations.

From a consumer's perspective, two different tax rates are paid when purchasing gasohol as opposed to gasoline. When buying gasoline, the buyer pays 13 cents per gallon state tax and 9 cents per gallon federal tax for a total of 22 cents tax on each gallon of gasoline. When buying one gallon of gasohol, the buyer pays 5 cents state tax and 3 cents federal tax or a total of 8 cents per gallon. The total exemption, therefore, is currently 14 cents per gallon of gasohol (8 cents state and 6 cents federal).

While actual federal and state motor fuel taxes were presented in Tables 1 and 2, tax exemptions are presented in Table 3. The total exemption in 1978 was 4 cents per gallon, consisting only of the federal exemption. With the addition of the state exemption, the total exemption rose to 8 cents per gallon in 1979. Subsequent state tax reductions for gasohol increased the total exemption to 10 cents, 12 cents and 14 cents in January 1984, January 1985 and July 1985, respectively. The total exemption currently stands at 14 cents per gallon, and is projected to decrease to 10 cents on July 1, 1987 where it will remain until 1992. At that time the federal and state exemptions are scheduled to be phased out, and gasohol will be taxed in the same manner as gasoline.

TABLE 3. HISTORICAL FEDERAL AND NORTH DAKOTA STATE GASOHOL TAX EXEMPTION.

Year	Exemption		
	Federal	State (ND)	Total Exemption
	(cents)		
1978	4	-	4
1979	4	4	8
1980	4	4	8
1981	4	4	8
1982	4	4	8
1983	5	4	9
1984	5	5	10
1985	6	6	12
1986	6	8 (July 85)	14
1987 (July)	6	4	10

Many states other than North Dakota have implemented tax incentive programs to promote local ethanol production. In fact, North Dakota's legislative history regarding gasohol tax exemptions actually follows many other states by several years. A brief description of the history of exemptions in selected midwestern states is presented in Table 4. A narrative summary of some major ethanol producing states and other midwestern states follows.

TABLE 4. HISTORICAL AND PROJECTED STATE MOTOR FUEL TAX EXEMPTIONS FOR GASOHOL, SELECTED UPPER MIDWEST STATES.[a]

Year	North Dakota	Iowa	Kansas	South Dakota[b]	Minnesota	Nebraska	Montana[c]
	(cents per gallon)						
1979	4.0	8.5	5.0	3.0	.0	5.0	7.0
1980	4.0	10.0	4.0	4.0	0	5.0	7.0
1981	4.0	10.0	3.0	4.0	2.0	5.0	7.0
1982	4.0	5.0	2.0	4.0	2.0	5.0	7.0
1983	4.0	5.0	4.0/5.0	4.0	2.0	5.0	7.0/70
1984	5.0	3.0	5.0	4.0	2.0	5.0	70.0
1985	6.0/8.0	2.0	4.0	3.0	2.0/4.0	5.0/3.0	70/50
1986	8.0	1.0	3.0	3.0/2.0 + 30	4.0/2.5	3.0	50
	(projected under current law)						
1987	8.0/4.0	1.0	3.0	2.0/30	2.5/2.0	3.0	50/30
1988	4.0	1.0	2.0	2.0/30	2.0	3.0	30
1989	4.0	1.0	2.0	2.0/30	2.0	3.0	30/0
1990	4.0	1.0	2.0	2.0	2.0	3.0	0
1991	4.0	1.0	2.0	2.0	2.0	3.0	0
1992	4.0	0.0	2.0	2.0	2.0	3.0	0

Source: Telephone survey of state transportation officials in respective states.

[a]Two numbers separated by a "/" indicate a change in the level of the exemption during the year.
[b]Producer credit (for new plants only) of $.30/gallon beginning in 1986.
[c]Producer credit of $.70/gallon beginning in 1983.

Many states have implemented several different types of programs related to ethanol production, generally based on some type of tax exemption or credit intended to develop or support ethanol plants located in their states. Gasohol tax exemptions are highly variable among states, ranging from one cent per gallon in Iowa, Nevada and Connecticut to 16 cents per gallon in Louisiana. As of April, 1986, 22 states offered some reduction in their motor fuel excise tax for gasohol sales (Table 5).

TABLE 5. STATE TAX EXEMPTIONS GRANTED TO GASOHOL PURCHASES, APRIL 1986.

State	Gasohol Exemption
	(cents per gallon unless specified)
Alabama	3.0
Alaska	8.0
Connecticut	1.0
Florida	2.0
Hawaii	exempted from state sales tax
Idaho	4.0
Illinois	exempted from part of sales tax
Indiana	exempted from part of sales tax
Iowa	1.0
Kansas	3.0
Kentucky	credit per gallon
Louisiana	16.0
Maine	4.0
Minnesota	2.5
Montana	credit per gallon
Nebraska	3.0
Nevada	1.0
New Mexico	11.0
NORTH DAKOTA	8.0
South Carolina	6.0
South Dakota	2.0 and credit/gallon
Tennessee	4.0
Texas	5.0
Washington	1.8

Source: "State Legislative Report," Highway Users Federation, April 10, 1986.

Three states, Hawaii, Illinois and Indiana, have implemented an exemption from state sales taxes on gasohol. Hawaii has exempted gasohol from their entire 4% sales tax, Illinois has exempted 3/5 of their 5% state sales tax, while Indiana exempts gasohol from 1/5 of their 5% sales tax. (On July 1, 1986, Illinois' exemption will decrease from 3/5 to 2/5, while Indiana's exemption will be eliminated on the same date.) In addition, at least three states, Kentucky, South Dakota, and Montana, offer a direct

credit to ethanol producers as an alternative to a tax exemption. Two states, Louisiana and New Mexico have higher per gallon exemptions than North Dakota.

ETHANOL PRODUCTION AND MARKETING

United States

Ethanol producing plants are located throughout the United States, but producing capacity is concentrated in the midwestern states (Figure 1). As shown in Table 6, ethanol production capacity is concentrated in relatively few firms, mostly in the midwestern states where large quantities of corn are produced. The plants shown in Table 6 are the largest facilities in the United States. In addition to the 18 plants shown in Table 6, approximately 50 additional smaller plants are currently operating in the United States. These smaller plants represent the 150 million gallons of "other" productive capacity shown in Table 6. It is difficult to determine the exact number of plants producing ethanol in the United States due to the many small producers who enter and exit the industry on a continual basis. However, approximately 60 additional plants are estimated to exist in the U.S., but are not currently producing ethanol.

Total production of ethanol in the U.S. has grown rapidly in the past seven years, from 20 million gallons in 1979 to an estimated 750 million gallons in 1986 (Figure 2). Most of this increase has occurred since 1981, when total production was only 75 million gallons.

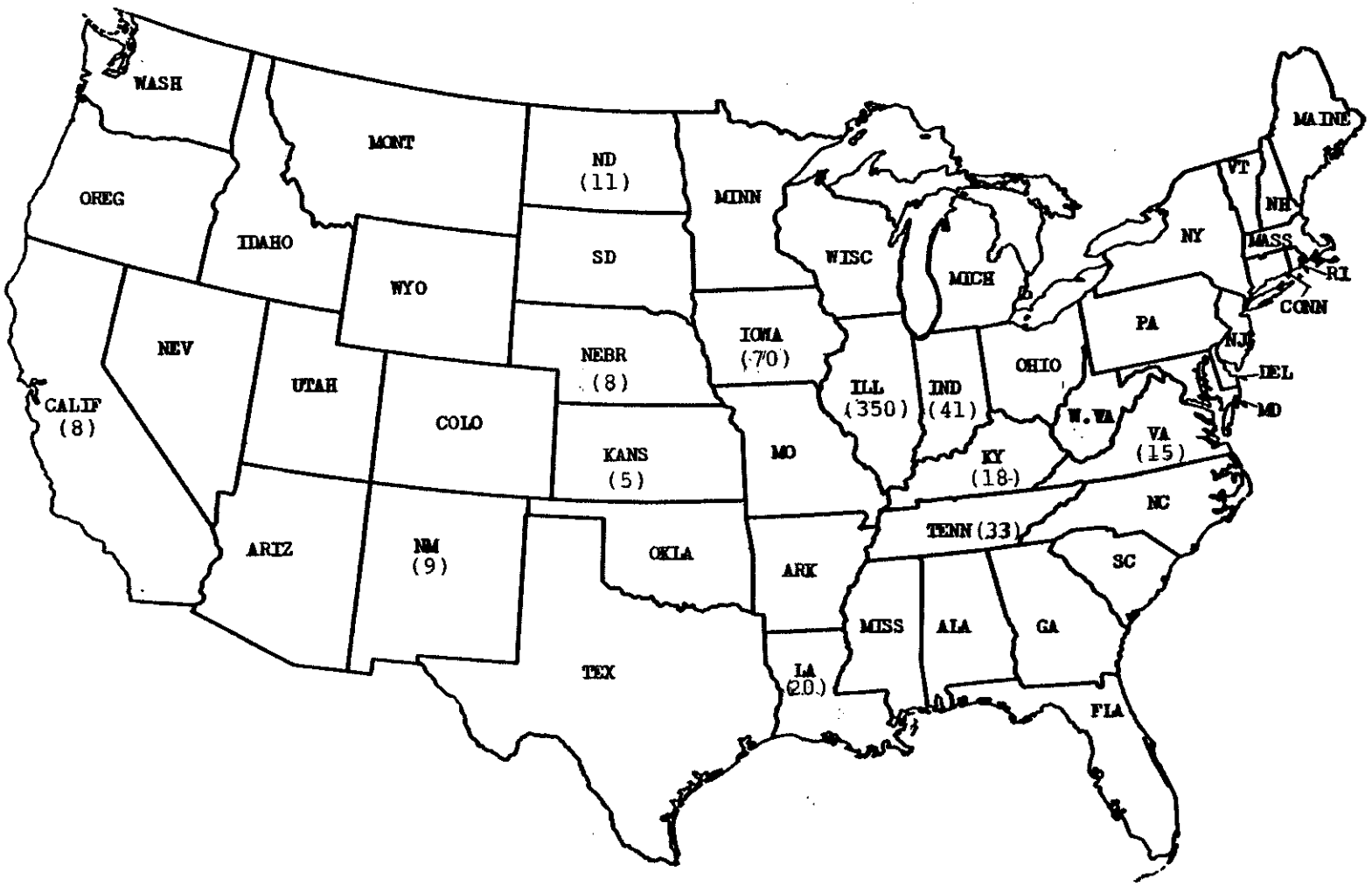

Figure 1. State Ethanol Production Capacity in Millions of Gallons per Year, 1985.

TABLE 6. MAJOR U.S. ETHANOL PRODUCING PLANTS, DEC. 31, 1985.

Producers	Capacity	Market Share
	(million gallons/year)	(% of total sales)
ADM (Decatur)	255	29.2
ADM (Peoria)	95	8.5
ADM (Cedar Rapids)	70	7.3
ADM (Clinton)	70	6.0
Pekin Energy	70	7.9
South Point Ethanol	60	6.6
New Energy	52	6.6
A. E. Staley	40	4.3
Shepard Oil	35	3.0
Kentucky A.E.P.	21	2.0
High Plains	10	.6
Grain Processing	10	1.2
Midwest Grain Prod	13	1.5
American Diversified	10	.9
Tennol	25	1.2
Dawn Enterprises	11	1.0
Energy Fuels Devl.	10	.9
Alchem	4.0	N.A.
Other	150	4.1
Imports	65	7.2

Source: Information Resources Incorporated

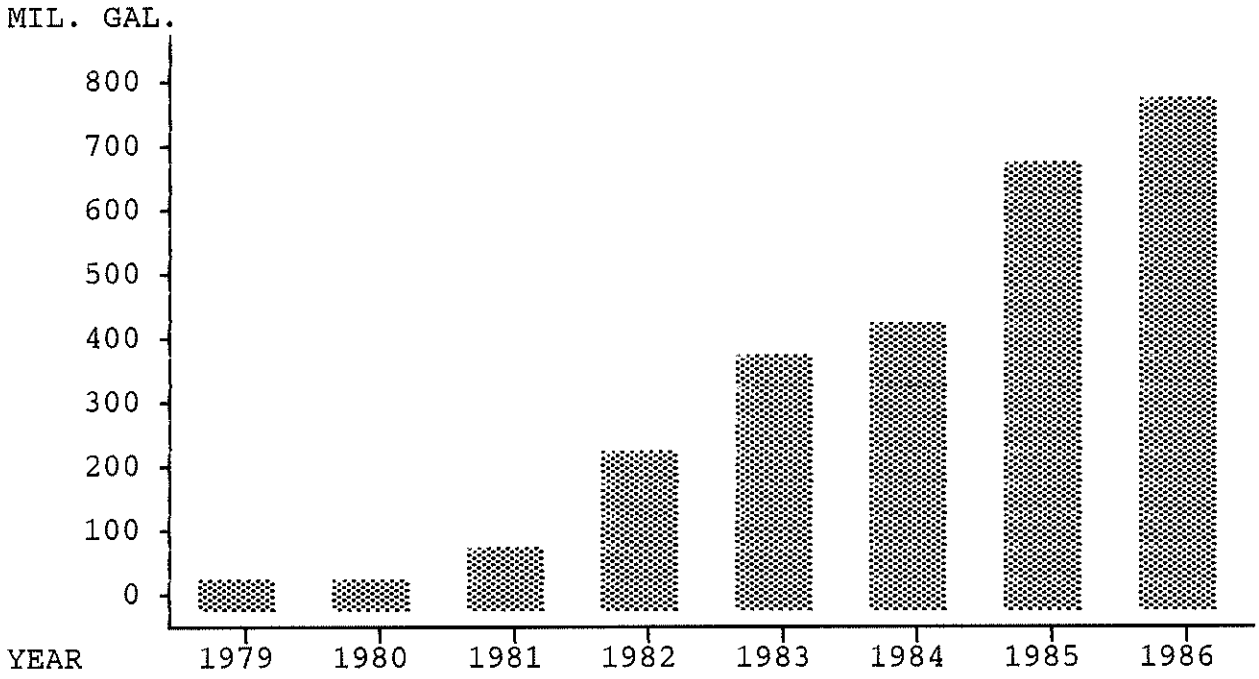

Figure 2. Historical U.S. Ethanol Production, 1979-1986.
Source: Information Resources Incorporated.

Growth in U.S. ethanol production has occurred primarily in the corn belt states of Illinois, Indiana, Iowa and Ohio (Table 7.) These four states accounted for 516 million of 650 million gallons produced in 1985 or approximately 80 percent of total production.

TABLE 7. HISTORICAL STATE FUEL ETHANOL PRODUCTION

State	1980	1981	1982	1983	1984	1985
			(million gallons)			
Illinois	28	56	123	205	196	350
Indiana	-	-	-	-	2	41
Iowa	-	3	52	61	70	70
Kansas	1	5	3	3	11	5
Kentucky	-	-	2	13	18	18
Louisiana	-	-	-	-	12	20
Nebraska	-	-	-	-	2	8
Ohio	-	-	2	35	52	55
Virginia	-	-	-	-	-	15
Tennessee	-	-	8	40	38	13
Small Scale Other Plants	11	11	20	18	29	35
Total	37	75	210	375	430	650

Source: Information Resources Incorporated.

North Dakota

North Dakota currently has two manufacturing facilities producing ethanol.[1] The larger plant, owned and operated by Dawn Enterprises, Inc., is located at Walhalla; the second plant is owned and operated by Alchem Inc. and is located at Grafton (Figure 3). Many more plants have been considered in North Dakota.

[1]Information regarding ethanol production and marketing from individual plants was obtained via personal interviews with officials from Dawn Enterprise and Alchem.

According to some estimates, well over 30 individual ethanol plant locations have been considered in the state.[2] Most of these projects, however, have received limited consideration from potential investors due to problems in obtaining necessary financing and uncertainties in levels of federal and state tax incentives.

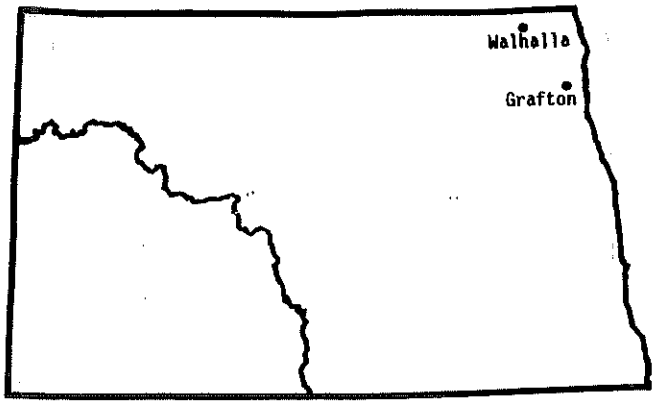

Figure 3. Locations of Existing Commercial Ethanol Producing Plants in North Dakota.

Ethanol production on a commercial scale began in July 1985 with the opening of the Dawn Enterprises plant in Walhalla, although some smaller plants had produced alcohol prior to this time (Table 8). The Walhalla plant began production at approximately 75 percent of capacity, and has operated at between 43 percent and 94 percent of capacity. Current production of 445,000 gallons between June 1 and June 16 is an annual production rate of approximately 10 million gallons, or 89 percent of rated capacity.

---

[2]Source: North Dakota Economic Development Commission.

TABLE 8. HISTORICAL ETHANOL PRODUCTION IN NORTH DAKOTA.

Month/Year	Producer		
	Dawn Enterprises	Alchem	Total
	(gallons)		
June 1985	-	-	-
July	692,822	-	692,822
August	420,252	-	420,252
September	399,263	-	399,263
October	591,329	-	591,329
November	621,685	-	621,685
December	781,572	-	781,572
January 1986	750,895	10,000	760,895
February	636,710	10,000	646,710
March	570,223	46,666	616,889
April	881,008	46,666	927,674
May	688,454	116,666	805,120
June	834,375[a]	200,000[b]	1,034,375

Source: Personal interviews with Dawn Enterprises and Alchem officials.

[a]Production rate of 27,812.5 gallons per day based on total monthly production of 445,000 gallons as of 6-16-86.
[b]Based on current production at 60 percent of rated capacity.

The second plant, operated by Alchem, Inc., began production at lower levels in January 1986, operating at approximately 10 percent of capacity for the first two months of production. Since then, the Grafton plant has increased production steadily, currently operating at 60 percent of rated capacity.

Total monthly ethanol production by both plants has grown from approximately 700,000 gallons in July 1985 to over 1 million gallons in June 1986 (based on first half of June production). Growth in North Dakota ethanol production is presented in Figure 4.

Figure 4. Ethanol Production in North Dakota, July 1985 to June 1986.

Concurrent with the growth in production of ethanol in North Dakota has been the growth in market share of the gasohol blend at the retail level (Figure 5).

Gasohol's market share has grown from approximately 2.4 percent in May 1985 to over 21 percent in January 1986, and declined to 17.4 percent in May 1986 (Figure 5). Gasohol sales, increased from 4.5 million gallons in May to 7.9 million gallons in June 1986, a 21 percent market share. At maximum producing capacity and assuming 80 percent of ND ethanol is sold in-state, market share of gasohol would be approximately 35 percent in fiscal year 1987.

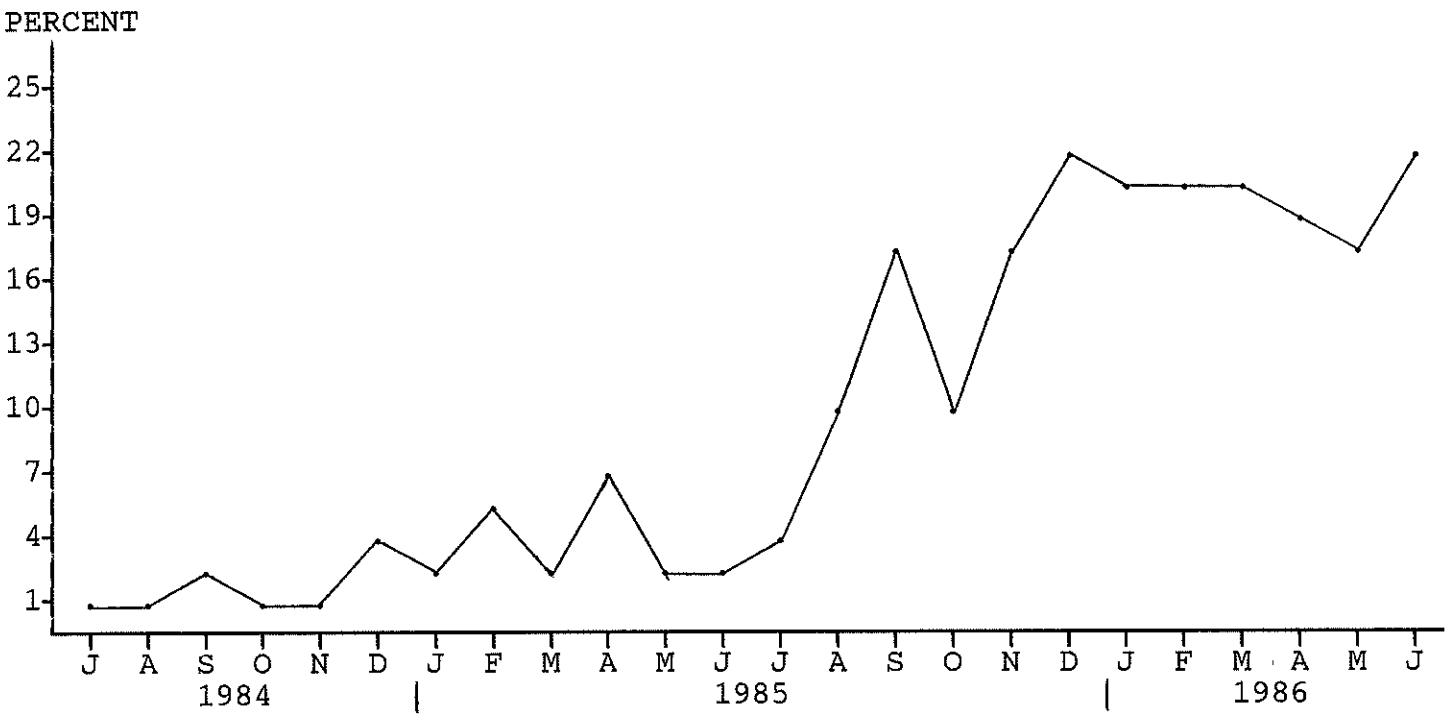

Figure 5. Market Share of Gasohol, North Dakota, July 1984 to June 1986. (June estimated)

Source: ND State Tax Department as reported to the ND State Highway Department.

Ethanol produced in North Dakota is marketed through several outlets. The state's two producers sell their product to a combination of major refiners, smaller independent brokers, and a pipeline system.[3] According to plant officials, approximately 90 percent of the ethanol sold in North Dakota goes in about equal proportions to major refiners and independents, while the remaining 10 percent is sold to terminals utilizing the pipeline system. Major refiners (such as Amoco or Cenex) blend ethanol

[3]No ethanol is transported through pipeline, however the product is sold to terminals where gasoline to be blended with ethanol is transported via pipeline.

with gasoline at their terminals to form gasohol. Independent brokers and those with tanks on the pipeline system purchase ethanol and bring it to their storage tanks for blending with gasoline. The product is then transported by truck from each of the blending points to retail outlets throughout the state. Locations of common terminals where ethanol is blended into gasohol are presented in Figure 6.

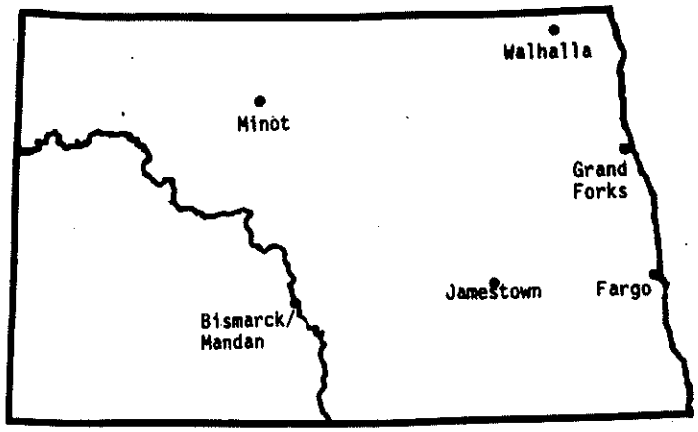

Figure 6. Location of North Dakota Terminals Where Ethanol is Blended into Gasohol.

Ethanol is shipped from the plants to blending points in North Dakota by both truck and rail. Alchem, Inc. in Grafton utilizes exclusively trucks for its ethanol shipments, although the plant does have access to rail services. Dawn Enterprises, on the other hand, ships about 60 percent of its in-state sales by truck, while 40 percent is shipped by rail. Thirty percent of Dawn Enterprise's product is shipped out-of-state, primarily to

Minneapolis. Eighty percent of Dawn Enterprise's out-of-state shipments move by rail.

The blended product (gasohol) is trucked to various retail outlets from each of the terminals where the blending actually takes place. The product is brokered to retail outlets within each terminal's "trade area," although no well-defined boundaries exist whereby only a particular seller will serve. Although distance from competing terminals will generally govern the economics of transporting gasohol to retail outlets, economics of individual shipments will depend on factors such as backhaul availability, type of retail ownership, local equipment supply, and other considerations.

ETHANOL PRICING

The price of ethanol as a fuel blend is determined in general by the price of competing fuels, particularly unleaded gasoline. The wholesale price of gasohol must be competitive with the wholesale price of unleaded gasoline in order for gasohol to be attractive to buyers. The price (or cost) of the components of each product will determine the competitiveness of each. A hypothetical example is presented below:

	Gasoline	Gasohol
	(cents)	(cents)
ND Regular Unleaded	70/gal	70 x 9/10 = 63/gal
Ethanol Transp/Brokerage	-	1
Ethanol Price	-	170 x 9/10 = 17
Federal Tax	9	3
State Tax	13	5
Wholesale Price	92/gal	89/gal

Therefore, as the price of regular unleaded gasoline changes, ethanol prices must be adjusted in order to make the price of gasohol competitive with gasoline.

Ethanol prices have dropped substantially in North Dakota since the price of crude oil, and therefore gasoline, has fallen. The price of ethanol has dropped from $1.95 per gallon in December 1985 to $1.40 in April 1986 (Figure 7).

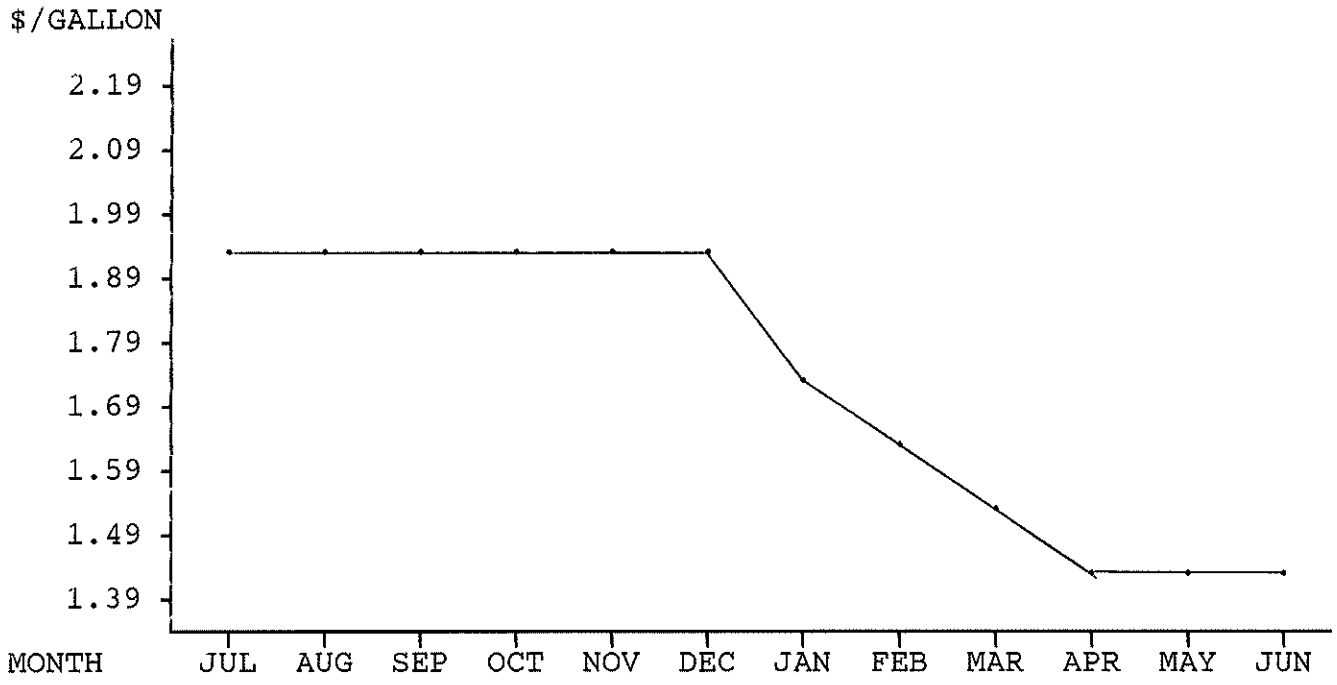

Figure 7. Price of Ethanol F.O.B. Plant, Walhalla, North Dakota, July 1985 to June 1986.

Source: Dawn Enterprises, Inc.

AGRICULTURAL PRODUCT UTILIZATION

A national policy supporting ethanol production as a means to mitigate energy shortages and price increases was also seen to have a side-benefit. During times of burdensome commodity supplies, utilization of grains in ethanol production was hoped to help alleviate surplus stocks and boost commodity prices. Although several different products can be utilized for fuel alcohol production, such as potatoes, sugar, etc., grain has been the primary raw product used in the process, particularly corn.

Commodity Utilization - U.S.

Corn is the primary grain utilized in the production of fuel alcohol from grains. North Dakota plants are the only ones known to use high proportions of barley in their operations. About 95 percent of production capacity is designed to produce ethanol from corn.[4] The U.S. ethanol industry used approximately 160 million bushels of corn in 1983, and 200 million bushels in 1984 (Table 9). In 1985, approximately 240 million bushels of corn were used to produce ethanol.

TABLE 9. U.S. CORN USE IN ALCOHOL PRODUCTION.

Crop Year[a]	Corn Utilization
	(million bushels)
1978	0
1979	10
1980	35
1981	80
1982	140
1983	160
1984	200
1985	240

Source: Feed Outlook & Situation Report, ERS, USDA, March 1986.

[a]Crop year September 1 through August 1.

Commodity Utilization - N.D.

While corn has been used in the production of ethanol for several years, barley has been utilized in the process since only July, 1985, beginning with the opening of the Dawn Enterprises

---

[4]Gill, Mohinder and Edward Allen, "Status of the U.S. Ethanol Market," Feed and Outlook Situation Report, ERS, USDA, August 1985.

plant in Walhalla. Both North Dakota ethanol producers currently use barley, while only the Walhalla plant uses some corn in producing ethanol (Table 10).

Barley consumption in ethanol production is increasing, but still represents less than one percent of total U.S. barley supplies. In 1985, total barley consumed in ethanol production was approximately 1.5 million bushels, compared to total U.S. barley supplies of 843.3 million bushels in the same year (Table 11). Total barley utilization by ethanol producers in 1986 (based on production to-date) will be approximately 4.1 million bushels, compared to total supplies of 959 million bushels (USDA

TABLE 10. COMMODITY UTILIZATION IN NORTH DAKOTA ETHANOL PRODUCTION, 1985-1986.

	Dawn Enterprises		Alchem		Total	
Month,Year	Barley	Corn	Barley[a]	Corn	Barley	Corn
June 1985	-	-	-	-	-	-
July	288,676	69,282	-	-	288,676	69,282
August	175,105	42,025	-	-	175,105	42,025
September	166,360	39,926	-	-	166,360	39,926
October	246,387	59,133	-	-	246,387	59,133
November	259,035	62,168	-	-	259,035	62,168
December	325,655	78,157	-	-	325,655	78,157
January 1986	312,872	75,090	5,555	-	318,427	75,090
February	265,296	63,671	5,555	-	270,851	63,671
March	237,593	57,022	25,925	-	263,518	57,022
April	367,086	88,100	25,925	-	393,011	88,100
May	286,856	68,845	64,814	-	351,670	68,845
June	347,656	83,438	111,111	-	458,767	83,438

[a]Based on reported percent of capacity output and conversion rate of 1.8 gallons of ethanol per bushel of barley.

TABLE 11. UTILIZATION OF U.S. GRAIN IN ETHANOL PRODUCTION COMPARED TO TOTAL SUPPLIES.

	Corn		Barley	
Year	Supply[a]	Ethanol Use[b]	Supply[c]	Ethanol Use[d]
	million bushels			
1978	8,380.5	0	638.4	0
1979	9,233.1	10	623.0	0
1980	8,257.7	35	563.4	0
1981	9,154.2	80	620.4	0
1982	10,410.0	140	674.4	0
1983	7,297.1	160	732.7	0
1984	8,382.7	200	798.7	0
1985	10,248.0	240	843.3	1.5
1986	11,080.0(est.)	N.A.	959.0(est.)	4.1[e]

[a]Source: USDA (various sources).
[b]Source: Feed Outlook and Situation, ERS, USDA, March 1986
[c]Source: ND Barley Council.
[d]Source: Personal interviews with officials from ethanol plants.
[e]Annualized based on utilization as of June, 1986.

estimated supplies). At full producing capacity, North Dakota's two ethanol plants could consume a total of 8.4 million bushels of barley, or 0.8 percent of total 1986 estimated U.S. barley supplies. Dawn Enterprises is currently consuming a 75%/25% barley-corn mix. If both plants were to use this ratio, total barley utilization at capacity would be approximately 6.3 million bushels, or 0.6 percent of total 1986 U.S. barley supplies.

By-Product Markets

Two by-products are manufactured as a result of ethanol production: distillers dried grains and solubles, and carbon dioxide. To this point, carbon dioxide is not recovered from North Dakota's plants due to the lack of an economical market for the product. Distillers dried grains and solubles (DDGS),

however, are an important part of the ethanol manufacturing process. For each bushel of barley consumed in the process, approximately 20 pounds of DDGS is produced. At current rates of ethanol production (June, 1986), approximately 3,600 tons of DDGS are produced by North Dakota's two ethanol plants per month (Table 12).

TABLE 12. DISTILLERS DRIED GRAINS AND SOLUBLES (DDGS) PRODUCED BY NORTH DAKOTA ETHANOL PLANTS BY MONTH.

	Producer		
Month, Year	Dawn Enterprises	Alchem	Total
	(tons)		
June, 1985	-	-	-
July	N.A.[a]	-	-
August	N.A.[a]	-	-
September	1,637	-	1,637
October	4,070	-	4,070
November	3,136	-	3,136
December	3,485	-	3,485
January, 1986	2,915	15	2,930
February	2,163	15	2,178
March	2,076	60	2,136
April	3,490	170	3,660
May	3,102	230	3,332
June	3,188[b]	460[c]	3,648

[a]No DDGS produced because plant was only converting 190 proof alcohol into 200 proof rather than producing its own ethanol from grains.
[b]Based on production of 1,700 tons through 6-16-86.
[c]Based on 60 percent of 4.0 million gallons/year capacity for the first half of June.

DDGS is sold as a high protein livestock feed supplement in both the domestic and export markets. Approximately 50 percent of DDGS from Dawn Enterprises is shipped to the export market,

primarily by rail to the Port of Duluth/Superior. The remaining 50 percent is shipped by rail and truck to feedlot and dairy operations in more than 20 different states. In total, more than 90 percent of the DDGS produced by Dawn Enterprises is shipped out of North Dakota. DDGS from Alchem in Grafton are shipped entirely to the domestic market, except for some samples shipped to prospective overseas buyers.

Availability of markets for DDGS is important to ethanol producers because of the impacts of DDGS sales on plant profitability. Selling this by-product effectively reduces the operation's cost of production, or alternatively, raises the selling price of its main product - ethanol. From either perspective, the net effect of selling DDGS is to increase the profitability of the ethanol producing operation. The price of DDGS has fallen recently, as have the prices of feedstocks in general. Although the fall in barley prices has helped ethanol producers in acquiring raw barley for ethanol production, the concurrent drop in prices of most feedstocks has lowered selling prices of DDGS.

FISCAL IMPACT OF GASOHOL TAX EXEMPTION

One major impact of increasing ethanol production in North Dakota has been the affect on availability of funds collected from motor fuel taxes in the Highway Distribution Fund. Taxes collected on motor fuels (gasoline, gasohol, and diesel), motor vehicle registration fees, and other sources are distributed to the State Highway Department, counties, and cities for construction and maintenance of their respective road and street systems. The direct effect of the gasohol tax exemption is that for each gallon of gasohol purchased, 8 cents of revenue to the Distribution Fund is forgone compared to if the purchase had been for gasoline or if the exemption were not granted. Current motor fuel taxes in North Dakota are presented in Table 13.

TABLE 13. NORTH DAKOTA MOTOR FUEL TAXES, JULY 1986

Fuel	Tax
	(cents per gallon)
Gasoline	13
Gasohol	5
Diesel	13

Recipients of apportionments from the Highway Distribution Fund, including the state's various jurisdictions, are concerned that the reduced level of the fund caused by the gasohol tax exemption is severely affecting their ability to maintain their road and street network at an acceptable level. In addition to

the direct recipients of the Distribution Fund's dollars, other groups who have an interest in the maintenance of the highway network have expressed concern over the gasohol exemption. These include groups such as the state's general contractors who receive contracts for rebuilding the system, and the motor carrier industry, who rely on the roadways for safe and effective transportation of freight.

An historical overview of funds collected through motor fuel taxes and deposited into the Highway Distribution Fund is presented in Table 14. Four types of state taxes are levied on motor fuels in North Dakota including:

1. A per gallon tax on gasoline sold at the retail level (current rate: 13 cents per gallon)

2. A per gallon tax on gasohol sold at the retail level (current rate: 5 cents per gallon)

3. A per gallon tax on special fuel (primarily diesel) sold at the retail level (current rate: 13 cents per gallon)

4. A 2 percent tax on agricultural, railroad, industrial and heating fuel otherwise exempt from the 13 cents per gallon tax on special fuel tax (#3 above).

TABLE 14. HISTORICAL HIGHWAY DISTRIBUTION FUND NET REVENUES FROM MOTOR FUEL TAXES, NORTH DAKOTA.

Year	Type of Motor Fuel			
	Gasoline	Gasohol	Diesel	Special Fuels
	(dollars)			
1975	21,109,947	-	3,444,073	2,087,788
1976	22,726,560	-	3,876,031	2,302,180
1977	24,575,095	-	4,597,013	2,601,065
1978	27,305,238	-	4,970,112	2,971,684
1979	28,573,941	1,000	6,189,546	3,458,560
1980	26,080,813	199,491	6,479,389	6,086,527
1981	23,974,863	511,606	6,279,801	6,390,079
1982	25,476,699	357,306	7,513,149	7,638,319
1983	26,413,114	199,947	7,338,825	6,324,924
1984	37,260,428	331,730	10,995,424	6,084,201
1985	36,931,226	490,954	11,856,840	6,033,517
1986	30,983,831	2,139,633	11,535,854	5,258,270
	(projected)			
1987	27,715,110	2,748,200	10,992,100	4,225,000
1988	27,253,050	5,433,200	10,843,975	4,320,000
1989	26,881,750	5,370,000	10,731,400	4,410,000

Source: "North Dakota Highway Statistics, 1985" prepared by Planning Division, North Dakota State Highway Department. Projections as provided to Controller, Finance Division, North Dakota State Highway Dept. by Planning Division, NDSHD.

Gasoline Taxes

Highway Distribution Fund revenues from gasoline taxes remained relatively stable between 1975 and 1983, ranging from a low of 21.1 million dollars in 1975 to 28.6 million dollars in 1979. The most significant change was between 1983 and 1984 when annual collections rose from 26.4 million to 37.3 million dollars. This increase was primarily caused by the passage of an

additional 5 cent per gallon tax by the 1983 legislature. With over 300 million net gallons of gasoline taxed annually in North Dakota, this tax increase gave a significant boost to the Highway Distribution Fund.[5]

Collections from gasoline taxes remained stable in 1984 and 1985 at approximately 37 million dollars, but 1986 collections fell to 30.9 million. This decrease was caused by several factors. First, the tax exemption for gasohol increased from 6 cents to 8 cents per gallon. In addition, total gallons of gasohol taxed increased from 8.0 million to over 58 million gallons between 1985 and 1986. This shift of taxable gallons from the higher gasoline tax rate to the lower gasohol tax rate has been the primary cause of reduced collections from gasoline sales. Also increased fuel efficiency of vehicles continues to reduce the amount of taxable gallons of retail gasoline sales.

Gasohol Taxes

Collections from gasohol taxes have not been a significant contributor to the Highway Distribution Fund, but are projected to total over five million dollars in both the 1988 and 1989 fiscal years. Although gasohol is taxed at a lower rate than gasoline, the number of gallons taxed has increased significantly, currently representing approximately 20 percent of

---

[5]One cent of the five cent per gallon tax increase was dedicated to the Township Road Fund and not available to the Highway Distribution Fund.

the total taxable gasoline/gasohol market. Gasohol tax collections are also projected to rise because of a lowering of the gasohol exemption in July 1987 from 8 cents to 4 cents per gallon.

Special Fuel (Diesel) Taxes

Highway Distribution Fund collections from diesel fuel taxes have been more stable than other motor fuel sources. Revenues rose steadily between 1975 and 1983 from 3.4 million to 7.3 million dollars. Revenues were boosted in the 1984 fiscal year from 7.3 to 11 million dollars, due primarily to the enactment of an additional 5 cents per gallon tax by the 1983 state legislature.

Special Fuels (2%) Taxes

Revenues from the 2 percent special fuels tax have also risen steadily. However, collections are expected to fall in 1987 due primarily to the lower fuel prices currently in effect.

The specific annual impact of the gasohol tax exemption for fiscal years 1985 and 1986 is presented in Tables 15 and 16. In order to isolate the effects of the gasohol tax exemption from other revenue-related factors (such as vehicle fuel efficiency), the actual gallons of gasohol taxed are detailed by month then multiplied by the appropriate tax exemption to arrive at a monthly revenue loss to the Highway Distribution Fund. As shown in Table 15, gallons of gasohol taxed remained below 1 million

gallons per month during the fiscal 1985 year. Also, the tax exemption was still at a lower level -- 5 cents for the first half of the year and 6 cents/gallon for the second half. These two factors combined led to a total revenue loss to the Highway Distribution Fund of approximately 450,000 dollars (Table 15).

TABLE 15. FISCAL IMPACT OF GASOHOL TAX EXEMPTION, FISCAL YEAR 1985, (JULY 1, 1984 - JUNE 30, 1985).

Month	Gasohol Taxed	Tax Exemption	Highway Dist. Fund Revenue Loss
	(gallons)	(cents/gallon)	($)
July 1984	508,291	5	25,415
August	488,024	5	24.401
September	544,428	5	27,221
October	492,101	5	24.605
November	528,392	5	26,420
December	550,771	5	27,539
January 1985	782,867	6	46,972
February	751,305	6	45.078
March	872,608	6	52,356
April	925,666	6	55,540
May	887,496	6	53.250
June	678,113	6	40,687
Total	8,010,062 gallons		$449,484

In the 1986 fiscal year (July, 1985 - June, 1986), two factors combined to substantially raise the revenues lost to the Highway Distribution Fund caused by the gasohol tax exemption. First, the total gallons taxed increased from an average of 667,000 gallons to over 4.8 million gallons per month. This factor is important because of the shift of these gallons from the higher taxed gasoline category to the lower taxed gasohol

category. Actual monthly gallons peaked in January 1986 at 6.5 million gallons and are projected to reach 7.9 million in June 1986. Second, the tax exemption on gasohol increased from 6 cents per gallon in the first half of calendar year 1985 to 8 cents in the last half of the year. These two factors combined resulted in a total Highway Distribution Fund revenue loss in fiscal 1986 of over 4.6 million dollars (Table 16).

TABLE 16. FISCAL IMPACT OF GASOHOL TAX EXEMPTION, FISCAL YEAR 1986 (JULY 1, 1985 - JUNE 30, 1986).

Month	Gasohol Taxed	Tax Exemption	Highway Dist. Fund Revenue Loss
	(gallons)	(cents/gallon)	($)
July 1985	1,670,976	8	133,678
August	3,248,122	8	259,850
September	3,693,772	8	295,502
October	4,357,243	8	348,579
November	6,334,110	8	506,729
December	6,131,864	8	490,549
January 1986	6,506,376	8	520,510
February	4,519,470	8	361,558
March	4,845,458	8	387,637
April	4,640,529	8	371,242
May	4,493,197	8	359,456
June	7,900,000(est.)	8	632,000
Total	58,341,117 gallons		$4,667,290

A summary of the fiscal impacts of the gasohol exemption for fiscal year, 1985 and 1986, as well as projections for 1987 and 1988, are presented in Table 17. Projections indicate that in fiscal year 1987 the loss to the Highway Distribution Fund from

the gasohol exemption will be approximately 5.5 million dollars. In fiscal year 1988, the loss is projected to be approximately 2.7 million dollars.

TABLE 17. ANNUAL FISCAL IMPACT OF GASOHOL EXEMPTION.

Fiscal Year	Total Impact	Jurisdictional Impact		
		State[a]	County[b]	City[c]
	----------dollars----------			
1985	449,484	283,175	104,730	61,579
1986	4,667,290	2,940,393	1,087,479	639,419
1987 (proj.)[d]	5,496,400	3,462,732	1,280,661	753,007
1988 (proj.)[d]	2,716,600	1,711,458	632,968	372,174

[a]Assumes 63% share of Highway Distribution Fund.
[b]Assumes 23.3% share of Highway Distribution Fund.
[c]Assumes 13.7% share of Highway Distribution Fund.
[d]Assumes 20 percent gasohol market share

Fiscal impacts of the gasohol exemption for individual recipients of funds from the Highway Distribution Fund are also presented in Table 17. In fiscal year 1986, the impact on the state highway department, counties and cities was 2.9 million, 1.1 million and 0.6 million dollars respectively. These three jurisdictions share in the funds taken into the Highway Distribution Fund, and therefore share losses to the Fund in the same proportions.

ALTERNATIVES AND IMPLICATIONS

Several potential alternatives for the future regarding the gasohol taxation situation in North Dakota are presented in this section. These alternatives are not all inclusive -- other preferable options may exist. The implications of each alternative are presented whenever data availability permitted. However, due to confidentiality and lack of information in some areas only general comments concerning some alternatives are given. No preference is intended to be given any one of these options -- each has its own merits and drawbacks depending on the individual's perspective and which sector of the economy is of primary interest to the reader.

1. Maintain Exemption Under Existing Law

Maintaining the exemption at its current level will continue to have a negative impact on the Highway Distribution Fund and the jurisdictions which receive funds from it. As outlined in Table 17, the total loss is estimated at 5.5 million dollars for fiscal 1987 and 2.7 million dollars in fiscal 1988. Similar losses may be expected for each year until 1992 when the exemption is scheduled to be phased out.

Leaving the gasohol exemption as is would have a positive impact on the ethanol industry relative to reducing the exemption. The ethanol producers rely on the exemption to make their product price competitive with other fuels. Under the existing law, it is expected that the state's two plants will

continue to provide a positive economic benefit to the region and purchase grains and other inputs in the area.

2. Accelerate Reduction of Exemption

The gasohol exemption is scheduled to be reduced from 8 cents to 4 cents per gallon on July 1, 1987. Reducing the exemption prior to its scheduled date would reduce the negative impact on the Highway Distribution Fund, depending on the specifics of the reduction. Reducing the exemption to 4 cents per gallon on January 1, 1987 rather than July 1 would add approximately 1.4 million dollars to the Fund[6] in fiscal 1987.

Reducing the exemption to 4 cents per gallon on January 1 1987 and subsequently eliminating the exemption on January 1, 1988 would add approximately 1.4 million dollars to the Fund in fiscal 1987, and add approximately 1.36 million dollars to the Fund in fiscal 1988.[7] Granting no exemption after this point would save the Fund approximately 2.7 million dollars per year beginning in fiscal 1989 until 1992, when the exemption is currently scheduled to expire.

Both of these scenarios whereby the gasohol exemption was reduced faster than currently scheduled would have a negative impact on the North Dakota ethanol industry. In general,

---

[6]Based on 50% of estimated 68,705,000 gallons of gasohol taxed at lower 4 cent exemption rate for entire 1987 calender year rather than at 8 cents exemption for first 6 months of 1987 calender year.

[7]Based on 50% of estimated 68,705,000 gallons of gasohol taxed at lower 4 cent exemption rate for entire 1987 calender year and 50% of estimated 67,915,000 gallons taxed at same rate as gasoline for last 6 months of fiscal 1988.

reducing the tax exemption will effectively lower the price at which ethanol producers will be able to sell their product. For each 1 cent per gallon that the tax exemption is reduced, the approximate ethanol price reduction will be 10 cents per gallon.[8] A price reduction for ethanol may be particularly harmful to the industry given price decreases that have already taken place caused by depressed oil prices.

3. Eliminate Gasohol Exemption

A complete elimination of the gasohol exemption would relieve the Highway Distribution Fund of subsequent revenue losses from the lower gasohol tax rate. Eliminating the exemption beginning January 1, 1987 would add approximately 2.7 million dollars to the Fund in the remainder of fiscal 1987[9] and approximately 2.7 million dollars per year after fiscal 1987 until 1992.[10]

Complete elimination of the gasohol tax exemption would have a severe impact on the price that ethanol producers can sell their product, and by some estimates, effectively bankrupt the operations. Producers would be forced to compete on an even

---

[8]Several factors will affect exactly the degree to which the 1 cent exemption/10 cent ethanol relationship holds true, including percent of capacity utilization, degree of out-of-state competition, and others.

[9]Based on 50% of estimated 68,705,000 gallons taxed same as gasoline for last half of fiscal 1987 rather than under 8 cent gasohol exemption.

[10]Based on estimated 68,915,000 gallons taxed at same rate as gasoline.

basis with other fuels, and depending on costs of production and ability to sell in other states, may be forced out of business.

4. Direct Industry Subsidy

One alternative may be to provide some direct subsidy to ethanol producers to offset losses suffered from any reductions in the gasohol tax exemption. Three states, Montana, Utah and South Dakota have implemented programs such as this, under different arrangements and varying conditions. Several alternatives may be considered, either individually or in some combination, for a funding source for such a program. These sources may include the state general fund, an economic development fund, the Highway Distribution Fund, funds from a per bushel check-off on grains, and others.

For each of these existing funds, utilizing a portion of the fund for an industry subsidy would detract from resources formerly channeled to other programs unless replaced by increasing revenues to that existing fund. For those funds mentioned above not already existing, the new funding source would have to be "sold" to those who would eventually be providing tax revenues to that fund.

Impacts of this alternative on the ethanol industry are unknown at this point due to a lack of practical application of this option in other states. For example, South Dakota has implemented a direct payment to producers program, but with the stipulation that only new plants qualify.

5. Gasoline Tax Increase to Offset Exemption Effects

In order to replace the loss to the Highway Distribution Fund, an additional tax may be implemented on gasoline or other fuels. With the exemption still in place, funds would continue to be lost to highway projects, but this loss would be compensated for by any additional tax levied on motor fuels.

An additional tax of approximately 1.9 cents per gallon on gasoline and gasohol would be required to provide the estimated 5.5 million dollars to be lost in fiscal 1987 due to the gasohol exemption.[11] In fiscal 1988 an additional tax of one cent per gallon would be required to offset the loss (Table 18).[12]

TABLE 18. ESTIMATED ADDITIONAL GASOLINE AND GASOHOL TAXES REQUIRED TO COMPENSATE FOR GASOHOL EXEMPTION.

Fiscal Year	Tax required to Compensate for Current Year Loss	Tax Required to Compensate for Previous Losses	Total
	----------cents per gallon----------		
1987	1.9	1.7	3.6
1988	1.0	-	1.0
1989	1.0	-	1.0
1990	1.0	-	1.0
1991	1.0	-	1.0
1992	1.0	-	1.0
1993	0.5	-	0.5

[11]Based on 343,525,000 total gallons taxed in fiscal 1987 and a 20 percent gasohol market share.

[12]Based on 339,575,000 total gallons taxed in fiscal 1988 and a 20 percent gasohol market share.

To compensate for the 4.6 million dollar loss in fiscal 1986, an additional tax of 1.6 cents per gallon would be required in fiscal 1987.[13] Losses in fiscal 1985 would require an additional tax of 0.1 cents per gallon.

Additional taxes required to compensate for losses to the highway distribution fund in fiscal years 1985 and 1986, as well as projected losses, are presented in Table 18.

[13]Based on 343,525,000 gallons taxed in fiscal 1987 and a 20 percent gasohol market share.