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(FORM UPDATED: 08/11/2010)

WISCONSIN STATE LEGISLATURE ... PUBLIC HEARING - COMMITTEE RECORDS

2003-04

(session year)

Assembly

(Assembly, Senate or Joint)

Committee on Agriculture...

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 - (**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
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- Miscellaneous ... **Misc**

* Contents organized for archiving by: Stefanie Rose (LRB) (August 2012)

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OF COUNSEL:
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December 23, 2003

Rep. Al Ott
Chair, Assembly Agriculture Committee
Room 318 North
State Capitol
P.O. Box 8953
Madison, WI 53708

Re: Testimony on AB 675 and 699

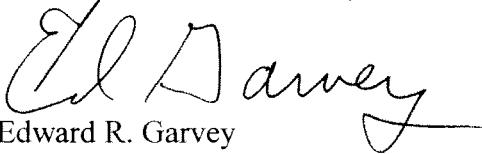
Dear Representative Ott:

Please find enclosed written testimony of Christa Westerberg for Garvey & Stoddard, S.C., on AB 675 and 699. This testimony was given on December 12, 2003. Please distribute this testimony and supporting documentation to the members of the Assembly Agriculture Committee.

Do not hesitate to contact us with any questions. Thank you.

Sincerely,

GARVEY & STODDARD, S.C.


Edward R. Garvey

cc (w/encl.): Christopher Pollek, Legislative Fiscal Bureau

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Testimony to the Wisconsin Assembly Agriculture Committee
Rep. Al Ott, Chair

From: Christa Westerberg

Date: December 12, 2003

Re: AB 699, regarding ethanol subsidies, and AB 675, regarding ethanol labeling

Thank you for allowing me the opportunity to speak to you today. I am an attorney at Garvey & Stoddard, S.C., in Madison. I want to alert you today to some activities that have been occurring at the local level regarding ethanol. The bottom line is that support for ethanol at the grassroots is not strong because people recognize ethanol is bad policy and a bad neighbor. It should therefore not be subsidized, and you should vote no on AB 699 and AB 675.

Over the past few years, our firm has been retained by citizens' groups in nine communities in Wisconsin to help them fight ethanol plants. Those nine communities are:

Adams County
Arlington (Concerned Citizens of Arlington)
Augusta (Concerned Citizens of Augusta)
Cambria (Cambrians for Thoughtful Development)
Dunn County (Concerned Citizens of Dunn County)
Elba (Stop the Ethanol Plants Now II, or STEP II)
Horicon (Citizens' Committee for the Preservation of Horicon)
Menomonie (Menomonie Area Concerned Citizens About Ethanol)
Oshkosh (Stop the Ethanol Plants Now III, or STEP III)

Local citizens have won their fights against ethanol siting in seven of these nine communities.¹

¹ Members of these community groups wished to come today but were unable to be here because, until yesterday, they were under the impression that this hearing was tomorrow due to an error in a *Wisconsin State Journal* article covering this issue. Some of them have sent you written testimony instead, and some are relying on me to share their views with you (though they are not paying me to be here or to write this testimony). A position paper released by several members of these citizens' groups in February of 2003 is attached as Exhibit C.

The citizens' groups did not lightly take on the fight against ethanol and ethanol plants. Many—like me—initially thought ethanol was a good thing. When they discovered ethanol might be coming into town, they researched the issues to find out whether an ethanol plant would be a bad neighbor, and if so, whether they could live with the consequences of having an ethanol plant nearby if it would serve a broader purpose. These were the people who had the incentive to investigate, and they found that **not only is ethanol a bad neighbor, but ethanol's well burnished image as an efficient and environmentally-friendly fuel is inaccurate.** The following summarizes their findings:

I. Ethanol is Bad Policy

1. Efficiency—Energy and Economic

Ethanol, as you know, is touted as a clean-burning fuel that can help reduce our dependence on foreign oil. But ethanol is not efficient, either from an energy or economic perspective, and does not reduce our nation's use of foreign oil.

According to a 2003 study by Cornell University scientist David Pimentel, **it takes more energy and fossil fuels—29% more—to produce ethanol than it yields.** This conclusion takes into account the resources necessary to grow the corn for ethanol, and then process it. Put another way, because it takes 99,119 BTU of energy to produce a gallon of ethanol, which in turn has an energy value of only 77,000 BTU, **ethanol is a net energy loser.** (Exhibit A at 128.)² Even political cartoonists recognize this fact. (Exhibit D.)

Likewise, **ethanol is not sustainable from an economic perspective.** The cost of producing a gallon of ethanol is about \$2.24 per gallon, while the cost of producing gasoline is about \$0.64 per gallon. (Exhibit A at 129.) Thus, ethanol requires massive subsidies to compete with gasoline: it is currently subsidized at about \$0.54 per gallon at the federal level, and \$0.20 average by states. (Exhibit A at 129, Exhibit B at 2.) This has led conservative groups like the Heritage Foundation to condemn ethanol as “**blatant ‘corporate welfare’**” and “a burden on taxpayers and consumers.” (Exhibit B at 2.) Indeed, Dr. Pimentel stated, “**without the more than \$1.4 billion of government subsidy each year, U.S. ethanol production would be reduced or cease, confirming the basic fact that ethanol production is uneconomical.**” (Exhibit A at 129.) One cannot escape the conclusion that if ethanol were as great as claimed, it could stand on its own in the open market.

2. Environmental Impacts

While ethanol is promoted as a clean-burning fuel, that is only a half-truth at best.

² While Dr. Pimentel's peer-reviewed studies have been attacked by consultants for the ethanol industry, such as Michael Graboski of the Colorado School of Mines, the attached Exhibit A addresses some of those attacks and further explains his conclusions. (Exhibit A at 129.)

Ethanol is classified as an additive that can increase the oxygen content of gasoline, which theoretically makes cars run cleaner. Some states and cities with poor air quality are required by the federal government to use oxygenated gasoline. MTBE is another fuel additive that meets the federal government's oxygenate requirement. However, oxygenates do not substantially decrease, and in fact may increase, air pollution, leading California Senator Diane Feinstein to request that the EPA waive California's oxygenate requirement. (Exhibit E.)

Ethanol is no exception. **Ethanol can reduce some tailpipe emissions, such as carbon monoxide (CO), but it increases others, such as nitrogen oxide (NOX), an ingredient in smog, other particulates, acetaldehyde, and volatile organic compounds (VOCs).** (Exhibit B at 4, Exhibit E at 2, Exhibit F at 2, 4.) This led the American Lung Association to conclude, "the reduction in CO tailpipe emissions obtained by using ethanol in summertime gasoline are not worth the increase in evaporation and the increases in NOX tailpipe emissions from a smog contribution point of view." (Exhibit F at 2.)

Ethanol use has other negative environmental effects as well. For example, while ethanol does not contaminate water supplies like its counterpart MTBE, its presence can expand the spread of toxins in gasoline, such as benzene, into our water supplies. (Exhibit B at 4, Exhibit G.) This says nothing of the significant environmental impacts of growing corn—such as soil erosion and water pollution from herbicides, insecticide, and fertilizers—or transporting ethanol. (Exhibit A at 130.)

II. Ethanol is a Bad Neighbor

As mentioned before, the communities our law firm has been involved with researched what it was like to live near an ethanol plant. They found the costs markedly outweigh the benefits.

1. *Air and Odor*

Ethanol processing creates tons—no exaggeration—of emissions and pollutants, such as VOCs, CO, and particulate matter, as well as a collection of pollutants referred to as the "Dirty 8," which include formaldehyde, methanol, acetic acid, and others. (Exhibit H, Exhibit K.) These emissions, by the ethanol industry's own admission, can have negative respiratory effects on children and the elderly. (Exhibit I at 8.)

The EPA and DNR have not done much to help reduce ethanol plant air emissions. After discovering a few years ago that ethanol plants emit far more pollutants than previously thought, EPA took the position that all ethanol plants should install thermal oxidizers. But thermal oxidizers do not eliminate all emissions—the Horicon plant, for example, would have emitted about 100 tons per year of CO *with* a thermal

oxidizer, as well as at least 50 tons of the “Dirty 8”—and may not reduce risks to health. (Exhibit K.)

As to odor, we have often heard ethanol proponents claim that ethanol plants emit only a pleasant, yeasty odor, like bread baking, or a “light popcorn smell.” Nothing could be further from the truth. If you are unsure, visit citizens in Lena, Illinois, who experienced **odors so bad that they had to go to court**. Or, go see Joanne Czajka who lives near the Badger State Ethanol plant in Monroe, Wisconsin. She will tell you the smell can easily make you dry heave just walking from her car to her house, a distance of about 30 feet. (Exhibit J.)

As engineer and odor expert Charles McGinley testified in Horicon, thermal oxidizers do not eliminate the odor problem, and in fact only catch about 80% of ethanol plant odor. (Ex. K at 97-92.) He predicted citizens there would consequently experience **headaches, nausea, and eye and throat irritation**. (Exhibit H.) Thus, Mr. McGinley advised that **ethanol plants should be located at least two and a half miles from the nearest residential area**. (Ex. K at 86.)

2. *Water Consumption*

Ethanol plants require either a high-capacity well to operate, or massive amounts of water from municipal systems. An ethanol plant was rejected in Cambria, Wisconsin, specifically because the high-capacity well needed—pumping up to 1,000 gallons per minute—would have adversely affected municipal water sources. (Exhibit L.)

3. *Safety*

Ethanol plants store large amounts of explosive materials on-site, such as ammonia, caustics, sulfuric acid, and the ethanol itself.³ (Exhibit M.) This creates serious safety issues for people living near the plants, or near rail and truck lines that ship ethanol and its components. Safety is also an issue for ethanol plant employees. For example, an employee at the Plover, Wisconsin ethanol plant was badly burned by an explosion in August of 2003. He suffered second-degree burns on 50% of his body and

³ The Horicon plant, had it been approved, would have stored the following on-site:

24,552 gallon ammonia tank
10,000 gallon gluco amylase tank
10,000 gallon alpha amylese tank
10,000 gallon caustic tank
10,000 gallon urea tank
5,000 gallon sulfuric acid tank

(Exhibit M.)

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was in the hospital for weeks. (Exhibit N.) More recently, an employee at an ethanol plant in Minnesota was tragically killed in an explosion there. (Exhibit O.)

All of the health and safety impacts identified above are compounded by the fact that, in many of the cases we have been involved in, **ethanol plants are proposed near the center of town**. In Cambria, the proposed plant would have been a stone's throw from a school. In Horicon, the plant would have been ¼ mile from the world-renowned Horicon Marsh. Thus, the ethanol bill you should really be considering is Senator Chvala's bill (SB 299) to prohibit ethanol plants from locating within five miles of a school.

4. *Economics*

The problems with ethanol plants are not outweighed by economic arguments at the local level any more than they are at the broader policy level. While ethanol is heavily subsidized by the government, very little of that largess gets passed on to the farmer. Rather, the subsidies go to processors like agribusiness giant Archer Daniels Midland ("ADM"), which controls over 40% of the ethanol market. (Exhibit B at 5.) In fact, it is estimated that **farmers will only see about a \$0.02 increase per bushel as a result of ethanol, or \$2.80 per acre**. (Exhibit A at 129.) It is no coincidence that most ethanol plants are located on rail lines, so processors can ship in corn from the lowest bidder. If the goal is to help farmers, we would be better off subsidizing them directly.

Also, **ethanol plants that start out as farmer-friendly co-ops may end up as buyouts by ADM or Cargill**. That is what happened in Marshall, Minnesota in late 2002, when ADM bought out Minnesota Corn Producers, the state's biggest farmers' cooperative. (Exhibit P.) In addition, if asked to list investors, we have found co-ops will not do so. How, then, can you determine the real owner?

II. **Vote No on AB 699**

Given all that we have learned, we believe **ethanol defies common sense at every level**. It is not a magic bullet for our nation's energy problems; it is not a "win-win" solution. It will help us neither in the short nor long term, and it draws focus from real energy answers. Ethanol truly is, as the Heritage Foundation aptly put it, "blatant corporate welfare."

Thus, **we think it is foolish to devote scarce state resources to an industry that is not worth the investment and cannot stand on its own two feet in the market**. If the federal subsidy for ethanol ends, or the federal government no longer requires oxygenates in gasoline, the ethanol market will collapse, and Wisconsin will be left with empty plants.

Yet the fiscal note for AB 699 indicates that the bill will subsidize ethanol plants

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at a **sum sufficient** to give them \$0.10 per gallon for the first eight years of their operation. This translates into millions of dollars, at least \$2.34 million the first year. The money would come from GPR funds. Presently, the state's existing ethanol plants are subsidized by tribal gaming funds for about \$1.9 million per year.

The communities who have faced ethanol head-on and decided they don't want it cannot all be wrong. Do not spend our tax dollars on this misguided policy.

III. Vote No on AB 675

There is also little grassroots support for AB 675, which would remove requirements that filling stations selling gasoline with ethanol indicate that fact on the pumps.

People have strong feelings about ethanol, either for or against. Some believe it is bad policy or that it is hard on their automobiles, and do not want to purchase it. Others love ethanol and want to go out of their way to purchase gas containing ethanol.

This bill would make it much more difficult for consumers to make that choice. It is hard to argue with the logic that more information is better, but this bill would make peoples' choices for them. In fact, this bill seems aimed at inducing those who dislike or disagree with ethanol to purchase it, as they won't know any better. This is supported by the earlier testimony of Mr. Ralph Groschen, who said that sales of gas with ethanol increased after Minnesota revoked its ethanol labeling requirement in 1989.

I was here when someone said earlier that federal law requires gas stations to keep a list of what their gasoline contains. But what federal law requires and reality are often very different things, and I am not sure the clerk at my local filling station will know where that list is and what is on it.

Thus, we cannot support AB 675. **Consumers show know what they're buying, and should be allowed to vote with their pocketbooks. This bill undermines these basic free market principles.**

List of Exhibits:

- Exhibit A: David Pimentel, *Ethanol Fuels: Energy Balance, Economics, and Environmental Impacts are Negative*, NATURAL RESOURCES RESEARCH, Vol. 12, No. 2, June 2003.
- Exhibit B: Erin M. Hymel, *Ethanol Producers Get a Handout from Consumers*, HERITAGE FOUNDATION BACKGROUNDER, No. 1603, Oct. 16, 2002.
- Exhibit C: Wisconsin Citizens' Ethanol Position Paper, Feb. 2003.
- Exhibit D: Ethanol Cartoon, WASHINGTON POST, 2003.
- Exhibit E: Press Release, Sen. Diane Feinstein, Senator Feinstein Reiterates Call to EPA to Exempt California from Federal Oxygenate Mandate (Sept. 10, 2003).
- Exhibit F: Testimony of A. Blakeman Early on Behalf of the American Lung Association before the Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety, Senate Environment and Public Works Committee, June 14, 2000.
- Exhibit G: Platt's Global Energy, Alternative to MTBE, 2000-2003, available at <http://www.platts.com/features/mtbe/alternative.shtml>.
- Exhibit H: Letter from Charles McGinley, P.E., to Horicon City Council (Aug. 26, 2003).
- Exhibit I: Didion Milling, Inc., *Cambria Facility Expansion Plan Project Summary*, Dec. 19, 2002.
- Exhibit J: Testimony of Joanne Czajka, Hearing Before the Horicon City Council, Aug. 26, 2003.
- Exhibit K: Testimony of Charles McGinley, Hearing Before the Horicon City Council, Aug. 26, 2003.
- Exhibit L: Letter from DNR to Didion Milling, April 21, 2003; Minutes of Cambria Village Board Meeting, June 2, 2003.
- Exhibit M: Chemical Storage Area portion of United Wisconsin Grain Producers' Site Plan for proposed Horicon, Wisconsin Ethanol Plant, May 16, 2003.
- Exhibit N: Stevens Point Journal, *Plover Man Hurt After Ethanol Plant Fire*, Aug. 8, 2003; Stevens Point Journal, *Thoughts, Prayers Appreciated for Injured Brother*, Aug. 11, 2003.
- Exhibit O: *Explosion, Fire Reported at Ethanol Plant in Benson*, MINNEAPOLIS STAR-TRIBUNE, Oct. 22, 2003.
- Exhibit P: Joy Powell, *Anatomy of a Controversy Surrounding MCP Sale*, MINNEAPOLIS STAR-TRIBUNE, Jan. 31, 2003.

Ethanol Fuels: Energy Balance, Economics, and Environmental Impacts are Negative

David Pimentel¹

Received 11 November 2002; accepted 17 January 2003

Several studies suggest that the \$1.4 billion in government subsidies are encouraging the ethanol program without substantial benefits to the U.S. economy. Large ethanol industries and a few U.S. government agencies, such as the USDA, support the production of ethanol. Corn-farmers receive minimal profits. In the U.S. ethanol system, considerably more energy, including high-grade fossil fuel, is required to produce ethanol than is available in the energy-ethanol output. Specifically about 29% more energy is used to produce a gallon of ethanol than the energy in a gallon of ethanol. Fossil energy powers corn production and the fermentation/distillation processes. Increasing subsidized ethanol production will take more feed from livestock production, and is estimated to currently cost consumers an additional \$1 billion per year. Ethanol production increases environmental degradation. Corn production causes more total soil erosion than any other crop. Also, corn production uses more insecticides, herbicides, and nitrogen fertilizers than any other crop. All these factors degrade the agricultural and natural environment and contribute to water pollution and air pollution. Increasing the cost of food and diverting human food resources to the costly inefficient production of ethanol fuel raise major ethical questions. These occur at a time when more than half of the world's population is malnourished. The ethical priority for corn and other food crops should be for food and feed. Subsidized ethanol produced from U.S. corn is not a renewable energy source.

KEY WORDS: Ethanol; costs; environment; food; pollution.

INTRODUCTION

A few government agencies, such as the USDA (Shapouri, Duffuld, and Wang, 2002), support ethanol production. Some industries, including Archer, Daniels, Midland (EV World, 2002), are making huge profits from ethanol production, which is subsidized by federal and state governments. Some politicians have the mistaken belief that ethanol production provides large benefits for farmers, whereas in fact the farmer profits are minimal. In contrast, numerous scientific studies have concluded that ethanol production does not provide a net energy balance, is not a renewable energy source, is not an economical fuel, and its production and use contributes to air pollution and global warming (Sparks

Commodities, 1990; Citizens for Tax Justice, 1997; Giampietro, Ulgiati, and Pimentel, 1997; Youngquist, 1997; Pimentel, 1998; NPRA, 2002; Croysdale, 2001; Pimentel, 2001; Fuel's Gold, 2002; CalGasoline, 2002; Lieberman, 2002; Hodge, 2002). Growing the large amounts of corn necessary for ethanol production occupies cropland suitable for food production and causes diverse environmental degradation problems (Pimentel, 1991; Pimentel and Pimentel, 1996).

Conclusions drawn concerning the benefits of ethanol production are incomplete or misleading when only some of the total energy inputs in the ethanol system are included in the assessment. The objective of this analysis is to update and assess all the recognized inputs that operate in the entire ethanol production system. These inputs include the direct costs in terms of energy and dollars for producing the corn feedstock as well as for the fermentation/distillation process. Additional costs to the

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consumer include federal and state subsidies, plus costs associated with environmental pollution and/or degradation that occur during the entire production system. Ethanol production in the United States does not benefit the nation's energy security, its agriculture, the economy, the environment, as well as government and consumer expenditures. Also, ethical questions are related to diverting land and precious food into fuel and actually adding a net amount of pollution to the environment.

ENERGY BALANCE

The conversion of corn and other food/feed crops into ethanol by fermentation is a well-known and established technology. The ethanol yield from a large plant is about 2.5 gallons of ethanol from a bushel of corn (56 pounds or 25.5 kg) (2.7 kg per liter of ethanol) (Pimentel, 2001). Thus, a hectare (2.47 acres \bar{U} 1 hectare) of corn yielding 8,590 kg could be converted into about 842 gallons of ethanol.

The production of corn in the United States requires a significant energy and dollar investment (Table 1). For example, to produce 8,590 kg/ha of corn using average production technology requires the expenditure of about 33.9 million BTU for the large number of inputs listed in Table 1 (about 293 gallons of gasoline equivalents/ha or 40,221 BTU/gallon of ethanol). This costs about \$580/ha for the 8,590 kg or approximately 6.8¢/kg of corn produced. Thus, for a gallon of ethanol, an energy equivalent of only 66% per gallon of gasoline, the corn feedstock alone costs 69¢ (Table 2).

Full irrigation (when there is little or no rainfall) requires about 100 cm of water per growing season. Only approximately 15% of U.S. corn production currently is irrigated (USDA, 1997). Of course not all of this requires full irrigation, so a mean value was used. The mean irrigation for all land growing corn grain is 8.1 cm per ha during the growing season. As a mean value, water is pumped from a depth of 100 m (USDA, 1997b). On this basis, the mean energy input associated with irrigation is 3.8 million BTU per hectare (Table 1).

The average costs in terms of energy and dollars for a large (65 to 75 million gallons/year), modern ethanol plant are listed in Table 2. Note the largest energy inputs are for corn feedstock and for the fuel energy used in the fermentation/distillation process. The total energy input to produce a gallon of ethanol is 99,119 BTU (Table 2). However, a gallon of ethanol has an energy value of only 77,000 BTU. Thus, there is

Table 1. Energy Inputs and Costs of Corn Production Per Hectare in the United States

Inputs	Quantity	BTU } 1000	Costs
Labor	6.2 hrs ^g	1,000 ^f	\$62.00 ^h
Machinery	55 kg ^a	5,656 ^m	103.21 ^m
Diesel	90 L ^b	3,600 ^e	23.40 ^f
Gasoline	56 L ^b	2,212 ^e	14.60 ^f
Nitrogen	148 kg ^c	10,952 ^v	81.40 ^j
Phosphorus	53 kg ^c	876 ^g	12.72 ⁱ
Potassium	57 kg ^c	744 ^g	17.67 ⁱ
Lime	699 kg ^c	880 ^e	14.00 ⁿ
Seeds	21 kg ^a	2,080 ^e	74.00 ^e
Irrigation	8.1 cm ^s	3,764 ^r	81.00 ^u
Herbicides	2.1 kg ^c	840 ^e	21.00 ^j
Insecticides	0.15 kg ^c	60 ^e	6.00 ^j
Electricity	13.2 kWh ^b	136 ^e	2.38 ^k
Transportation	222 kg ^d	1,072 ^e	66.60 ^o
TOTAL		33,872	\$579.98
8,590 kg yield ^p		123,696	
		BTU input: output \bar{U} 1:3.65	

^aPimentel and Pimentel (1996).

^bUSDA (1991).

^cUSDA (1997a).

^dGoods transported include machinery, fuels, and seeds that were shipped an estimated 1,000 km.

^ePimentel (1980).

^fIt is assumed that a person works 2,000 hrs per year and utilizes an average of 8,100 liters of oil equivalents per year.

^gFAO (1999).

^hIt is assumed that farm labor is paid \$10 per hour.

ⁱSoil Fertility Guide (2002).

^jIt is assumed that herbicide prices are \$10 per kg.

^kPrice of electricity is 7¢ per kWh (USBC, 2001).

^lIt is assumed that insecticide prices are \$40 per kg.

^mHoffman, Warnock, and Hinman (1994).

ⁿAssumed to be 2¢ per kg (Clary and Haby, 2002).

^oTransport was estimated to cost 30¢ per kg.

^pUSDA (2001).

^qNASS (1999).

^rBatty and Keller (1980).

^sUSDA (1997b).

^tDiesel and gasoline assumed to cost 26.5¢ per liter.

^uIrrigation for 100 cm of water per hectare costs \$1,000 (Larsen, Thompson, and Harn, 2002).

^vAn average of energy inputs for production, packaging, and shipping per kilogram of nitrogen fertilizer from FAO (1999), Duffy (2001), and Fertilizer (2002).

^wHulsbergen and others (2001).

a net energy loss of 22,119 BTU per gallon of ethanol produced. Put another way, about 29% more energy is required to produce a gallon of ethanol than the energy that actually is in the gallon of ethanol produced (Table 2). Not included in this analysis was the distribution energy to transport the ethanol. DOE (2002) estimates this to be 8¢/gallon or approximately more than 5,000 BTU/gallon of ethanol.

Table 2. Inputs Per Gallon of 95% Ethanol Produced from Corn^a

Inputs	kg	BTU	Dollars
Corn	10.2 ^b	40,221 ^b	\$0.69 ^b
Transport of corn	10.2 ^b	4,727 ^c	0.22 ^d
Water	601 ^e	1,353 ^h	0.08 ^d
Stainless steel	0.023 ^e	1,348 ^e	0.04 ^d
Steel	0.045 ^e	2,106 ^e	0.04 ^d
Cement	0.12 ^e	909 ^e	0.04 ^d
Coal	1.40 ^f	39,076 ^f	0.08 ^g
Electricity	0.91 kWh ^f	9,379 ^f	0.06 ^g
Pollution control costs	—	—	0.23 ^d
TOTAL		99,119	\$1.48

^aOutputs: 1 gallon of ethanol ÷ 77,000 BTU^bTable 1.^cEstimated (90 mile roundtrip).^dPimentel and others (1988).^eSlesser and Lewis (1979).^fLarry Johnson (personal communication, Delta-T, 2001).^gUSBC (2001).^hPimentel and others (1997).

In the fermentation/distillation process, the corn is finely ground and approximately 13 gallons of water are added per 10.2 kg of ground corn. After fermentation, to obtain a gallon of 95% pure ethanol from the 8% ethanol and 92% water mixture, the ethanol must come from the approximately 13 gallon ethanol/water mixture. A total of about 12 gallons of waste water must be removed per gallon of ethanol produced. Although ethanol boils at about 78°C in contrast to water at 100°C, the ethanol is not extracted from the water in one distillation process. Instead, about 3 distillations are required to obtain the 95% pure ethanol (Wereco-Brobby and Hagan, 1996; S. Lamberson, pers. comm., Cornell University, 2000). To be mixed with gasoline, the 95% ethanol must be processed further and more water removed requiring additional fossil energy inputs to achieve 99.8% pure ethanol. The entire distillation accounts for the large quantities of fossil energy that are required in the fermentation/distillation process (Table 2). Note, in this analysis all the added energy inputs for fermentation/distillation process are totalled, including the apportioned energy costs of the stainless steel tanks and other industrial materials (Table 2).

About 50% of the cost of producing ethanol (\$1.48/gallon) in a large-production plant is for the corn feedstock itself (69¢/gallon) (Table 2). The next largest input is for transportation of the corn feedstock (Table 2).

Based on current ethanol production technology and recent oil prices, ethanol costs substantially

more to produce in dollars than it is worth on the market. Clearly, without the more than \$1.4 billion of government subsidy each year, U.S. ethanol production would be reduced or cease, confirming the basic fact that ethanol production is uneconomical (National Center for Policy Analysis, 2002). Federal subsidies average about 60¢/gallon and state subsidies average 20¢/gallon (Pimentel, 1998). Because the relatively low energy content of ethanol, 1.5 gallon of ethanol have the energy equivalent of 1 gallon of gasoline. Thus, the cost of producing an equivalent amount of ethanol to equal a gallon of gasoline is \$2.24, whereas the current cost of producing gasoline is about 63¢/gallon (USBC, 2001).

Federal and state subsidies for ethanol production total more than \$1.4 billion/year and are paid mainly to large corporations (EV World, 2002). To date, a conservative calculation suggests that corn farmers are receiving optimistically only an added 2¢ per bushel for their corn or about \$2.80 per acre because of the corn ethanol production system (Pimentel, unpubl. data). Some politicians have the mistaken belief that ethanol production provides large benefits for farmers, while in fact the farmer profits are minimal. However, several industries, such as Archer, Daniels, Midland, are making huge profits from ethanol production (EV World, 2002). The costs to the consumer are greater than the \$1.4 billion/year used to subsidize ethanol production because producing the required corn feedstock increases corn prices. One estimate is that ethanol production is adding more than \$1 billion to the cost of beef production (National Center for Policy Analysis, 2002). Because about 70% of the corn grain is fed to U.S. livestock (USDA, 2001), doubling or tripling ethanol production can be expected to increase corn prices further for beef production and ultimately increase costs for the consumer. Therefore, in addition to paying tax dollars for ethanol subsidies, consumers are expected to pay significantly higher food prices in the market place.

Currently about 1.7 billion gallons of ethanol (1.1 billion gallons of gasoline equivalents) are being produced in the United States each year (Shapouri, Duffuld, and Wang, 2002). This amount of ethanol provides only about 0.9% of the gasoline utilized by U.S. automobiles each year. To produce the 1.7 billion gallons of gasoline equivalents (only 0.8% of total gasoline) using ethanol we must use about 2.2 million ha of land; if we produced 10% of U.S. gasoline, the land requirement would be 22 million ha. Moreover, significant quantities of energy are needed to sow, fertilize, and harvest the corn feedstock.

In part, the energy and dollar costs of producing ethanol can be offset partially by the by-products produced, such as the dry distillers grains (DDG) made from dry-milling. From about 10 kg of corn feedstock, about 3.3 kg of DDG can be harvested that has 27% protein (Stanton, 1999). This DDG has value for feeding cattle that are ruminants, but has only limited value for feeding hogs and chickens. The DDG generally is used as a substitute for soybean feed that has 49% protein (Stanton, 1999). Soybean production for livestock production is more energy efficient than corn production because little or no nitrogen fertilizer is needed for the production of this legume (Pimentel and others, 2002). Only 2.1 kg of 49% soybean protein is required to provide the equivalent of 3.3 kg of DDG. Thus, the credit fossil energy per gallon of ethanol produced is about 6,728 BTU (Pimentel and others, 2002). Factoring this credit in the production of ethanol reduces the negative energy balance for ethanol production from 29% to 20% (Table 2). Note, the resulting energy output/input comparison remains negative even with the credits for the DDG by-product.

Although the by-products provide a few benefits, when considering the advisability of producing ethanol for automobiles, the amount of cropland required to grow sufficient corn to fuel each automobile should be understood. To make ethanol production seem positive, I use the Shapouri, Duffield, and Wang (2002) suggestion that all natural gas and electricity inputs be ignored and only gasoline and diesel fuel inputs be assessed. Then, using Shapouri, Duffield, and Wang's input/output data, this results in an output of 775 gallons of ethanol per hectare. The lower energy content of ethanol means that this has the same energy as 512 gallons of gasoline. An average U.S. automobile travels about 20,000 miles/yr and uses about 1,000 gallons of gasoline per year (USBC, 2001). To replace only a third of this with ethanol, 0.6 ha of corn must be grown—0.6 ha of cropland currently is required to feed each American. Therefore to feed one automobile with ethanol, using Shapouri, Duffield, and Wang's optimistic data, in order to substitute for a third of the gasoline used per automobile, Americans would require as much cropland as they need to feed themselves!

Until recently, Brazil had been the largest producer of ethanol in the world. Brazil used sugarcane to produce ethanol and sugarcane is a more efficient feedstock for ethanol than corn grain (Pimentel and Pimentel, 1996). However, the energy balance was negative and the Brazilian government subsidized the

ethanol industry. There the government was selling ethanol to the public for 83¢ per gallon that was costing them \$1.25 per gallon to produce for sale (Pimentel and others, 1988). Because of serious economic problems in Brazil, the government has abandoned subsidizing ethanol (Spirits Low, 1999; Coelho and others, 2002), and without the subsidy, ethanol production is no longer economically feasible for the producers.

ENVIRONMENTAL IMPACTS

Some of the economic and energy contributions of the by-products mentioned earlier are negated by the environmental pollution costs associated with ethanol production. These are estimated to be more than 23¢ per gallon (Table 2). U.S. corn production causes more total soil erosion than any other U.S. crop (Pimentel and others, 1995; Pimentel, 2002). In addition, corn production uses more herbicides and insecticides than any other crop produced in the U.S. thereby causing more water pollution than any other crop (Pimentel and others, 1993). Further, corn production uses more nitrogen fertilizer than any crop produced and therefore is a major contributor to ground water and river water pollution (NAS, 2002). In some Western irrigated corn acreage, ground water is being mined 25% faster than the natural recharge of its aquifer (Pimentel and others, 1997).

All these factors suggest that the environmental system in which U.S. corn is being produced is being rapidly degraded. Further, it substantiates the conclusion that the U.S. corn production system is not environmentally sustainable for the future, unless major changes are made in the cultivation of this major food/feed crop. Corn is raw material for ethanol production, but cannot be considered to provide a renewable energy source.

Major air and water pollution problems also are associated with the production of ethanol in the chemical plant. EPA (2002) has issued warnings to ethanol plants to reduce their air pollution emissions or be shut down. Another pollution problem is the large amounts of waste water that each plant produces. As mentioned, for each gallon of ethanol produced using corn, about 12 gallons of waste water are produced. This waste water has a biological oxygen demand (BOD) of 18,000 to 37,000 mg/liter depending of the type of plant (Kuby, Merkoja, and Nackford, 1984). The cost of processing this sewage in terms of energy or dollars was not included in the cost of producing ethanol. If added, it would increase the ethanol

production costs by 6¢ per gallon (Pimentel and others, 1988).

Ethanol contributes to air pollution problems when burned in automobiles (Youngquist, 1997; Hodge, 2002). In addition, the fossil fuels expended for corn production and later in the ethanol plants amount to expenditures of 99,119 BTU of fossil energy per gallon of ethanol produced (Table 2). The consumption of the fossil fuels release significant quantities of pollutants to the atmosphere. Furthermore, carbon dioxide emissions released from burning these fossil fuels contribute to global warming and are a serious concern (Schneider, Rosencranz, and Niles, 2002). When all the air pollutants associated with the entire ethanol system are measured, ethanol production contributes to the U.S. air pollution problem (Youngquist, 1997). Overall, if air pollution problems were controlled and included in the production costs, then ethanol production costs in terms of energy and economics would be significantly increased.

ETHANOL PRODUCTION—POSITIVE OR NEGATIVE?

The interesting recent USDA report concerning ethanol production as referred to (Shapouri, Duffield, and Wang, 2002), presents a more optimistic perspective than the one detailed in the analysis contained in this paper. Unfortunately, some major energy inputs in corn production were either out-of-date or omitted. Information on corn input production data were from 1991, and production data covered only nine states instead of all 50 states. The increased energy required to produce hybrid corn, which now is planted exclusively in the United States, was not included.

Energy input assumed for nitrogen fertilizer was about half of the usual production costs. In addition, energy inputs required for construction and maintenance of the farm machinery were not included. The USDA analysis limits irrigation use to only nine states and does not include any energy for the irrigation equipment. These nine states have limited irrigation compared with the inputs from all 50 states.

The USDA assigns a high credit of 19% for the coproduct DDG that is used to feed cattle. However, if the DDG is used as a soybean substitute, then logically credit should be based on soybean feed. When this is done, the credit in DDG is calculated to be only 9%, not 19%.

Last but not the least, the USDA does not acknowledge the costs of the many environmental impacts that result in ethanol production. These include, serious soil erosion, heavy insecticide and herbicide use, and the use of enormous quantities of nitrogen fertilizer. All of these cause serious pollution in the United States (NSA, 2002); plus, ethanol production contributes to the global warming problem.

Based on the optimistic use of data, the USDA report states that the total inputs amount to 75% of the ethanol output (Shapouri, Duffield, and Wang, 2002). Also, the authors point out that gasoline, diesel and fuel oil constitute only a part of the total inputs that also include large amounts of natural gas and electricity. However, on the same basis of Shapouri, Duffield, and Wang's analysis, Ferguson (2003) demonstrates that it is impossible to justify ethanol production even on the terms of gain in liquid ethanol; he shows that in order to satisfy transport demands of *just one year* of U.S. population growth, would require 5 million hectares (50,000 km²) devoted to corn-ethanol crops. Moreover, to supply this one year of population growth, for a period of 70 years (a lifetime) environmental pollutants would amount to 52,000 tons of insecticides, 735,000 tons of herbicides, plus a total of 93 million tons of fertilizers (nitrogen, phosphorus, and potassium). It also would cause the loss of 5 cms of soil (averaged for conventional and no-till corn).

FOOD VERSUS FUEL ISSUES

Using corn, a human food resource, for ethanol production, raises major ethical and moral issues. Today, malnourished (calories, protein, vitamins, iron, and iodine) people in the world number about 3 billion (WHO, 2000). This is the largest number of malnourished people and proportion ever reported in history. The expanding world population that now number 6.2 billion complicates the food security problem (PRB, 2001). More than a quarter million people are added each day to the world population, and each of these human beings requires adequate food.

Malnourished people are highly susceptible to various serious diseases, this is reflected in the rapid rise in number of seriously infected people in the world as reported by the World Health Organization (Pimentel and others, 1999; Kim, 2002).

The current food shortages throughout the world call attention to the importance of continuing U.S. exports of corn and other grains for human food. Cereal

grains make up 80% to 90% of the food of people worldwide. During the past 10 years, U.S. corn and other grain exports have nearly tripled, increasing U.S. export trade by about \$3 billion per year (USBC, 2001). Not only does corn exports strengthen the U.S. trade balance, but more importantly they are helping to feed people who need food for survival.

Concerning the U.S. balance of payments, the U.S. is importing more than 60% of its oil at a cost of more than \$75 billion per year (USBC, 2001). Oil imports are the largest deficit payments incurred by the United States (USBC, 2001). Ethanol production requires large fossil energy inputs, therefore it is contributing to oil and natural gas imports and U.S. deficits (USBC, 2001).

At present, world agricultural land based on calories supplies more than 99.7% of all world food, whereas aquatic ecosystems supply less than 0.3% (FAO, 1998). Already worldwide, during the last decade per capita available cropland decreased 20%, irrigation 12%, and fertilizers 20% (Brown, 1997). Expanding ethanol production could entail diverting valuable cropland from producing corn needed to feed people to producing corn for ethanol factories. This creates serious practical as well as ethical problems. Thus, the practical aspects, as well as the moral and ethical issues, should be seriously considered before steps are taken to convert corn into ethanol for automobiles.

CONCLUSIONS

The forgoing analysis, for which all major energy inputs required in ethanol production were assessed, confirms that ethanol production produces a 29% negative energy balance. Ethanol is not a net additional energy source, is an uneconomical fuel, and its overall production system causes serious environmental degradation. This analysis agrees with the findings of the U.S. Department of Energy (ERAB, 1980, 1981), Sparks Commodities (1990), Giampietro, Ulgiati, and Pimentel (1997), Pimentel (2001), and Hodge (2002).

At present, the total cost to produce a gallon of ethanol from corn is \$2.24. Using the by-products produced in ethanol production may reduce the cost to about \$1.79. But then, adding on an estimated 36¢ to cover some of the pollution brings the cost up to \$2.15 per gallon of gasoline equivalent.

Certainly, in terms of economics ethanol would not be produced without the high federal and state

subsidies which average about 80¢ per gallon. Doubling or tripling the amount of ethanol produced would increase the cost to tax payers two to four times the current \$1.4 billion in current subsidies each year. With current budget deficits, is this increasing ethanol production a sound policy?

The real costs to the consumer, however, are considerably greater than the \$1.4 billion in subsidies (federal and state) and would involve large environmental costs. Not only do subsidies increase taxes, but result in high corn prices that translate into higher meat, milk, and egg prices for the consumer, without any actual energy or environmental benefits.

ACKNOWLEDGMENTS

I thank the following scientists for reviewing earlier drafts of the manuscript and for their many helpful suggestions: A. Ferguson, Senior Researcher, Optimum Population Trust, Manchester, U.K.; P. Weisz, Chemical Engineering, Pennsylvania State University; W. Youngquist, Consulting Geologist, Eugene, Oregon; P. Harriot, Chemical Engineering, Cornell University; and M. Pimentel, Division of Nutritional Sciences, Cornell University.

REFERENCES

- Batty, J. C., and Keller, J., 1980, Energy requirements for irrigation, in Pimentel, D., ed., *Handbook of Energy Utilization in Agriculture*: CRC Press, Boca Raton, FL, p. 35-44.
- Brown, L. R., 1997, *The Agricultural Link: How Environmental Deterioration Could Disrupt Economic Progress*: Worldwatch Institute, Washington, DC, 73 p.
- CalGasoline., 2002, Ethanol Is Not a Suitable Replacement for MTBE: CalGasoline.com. (9/17/2002).
- Citizens for Tax Justice, 1997, More Corporate Giveaways High on Congressional Agenda: Citizens for Tax Justice. July 22, 1997. <http://www.ctj.org/html/cgives97.htm>. (9/17/2002).
- Clary, G. M., and Haby, V. A., 2002, Potential for Profits from Alfalfa in East Texas: <http://ruralbusiness.tamu.edu/forage.alfcop.pdf>. (9/2/2002).
- Coelho, S. T., Bolognini, M. F., Silva, O. C., Paletta, C. E. M., 2002, Biofuels in Brazil: The Current Situation: CENBIO—The National Reference Center on Biomass. http://www.cenbio.org.br/doc_port3.html. (11/12/2001).
- Croysdale, D., 2001, Belatedly, DNR Concedes Our Air is Clean: The Daily Reporter. November 6, 2001. <http://www.dailyreporter.com/editorials/eds/nov07/asa11-7.shtml>. (9/17/2002).
- DOE, 2002, Transport costs of ethanol total 8¢ per gallon: U.S. Department of Energy, Washington, D. C. <http://www/eia.doe.gov/oiaf/servicerpt/fuel/pdf/question3.pdf> (10/8/2002).
- Duffy, M., 2001, Prices on the Rise: How will Higher Energy Costs Impact Farmers?: <http://www.ag.iastate.edu/centers/leaopold.newsletter/2001-1/leoletter/energy.html>. (9/3/2002).

- EPA, 2002, More Pollution Than They Said: Ethanol Plants Said Releasing Toxins: New York Times. May 3, 2002.
- ERAB, 1980, Gasohol: Energy Research Advisory Board, U.S. Department of Energy. Washington, DC, 34 p.
- ERAB, 1981, Biomass Energy: Energy Research Advisory Board, U.S. Department of Energy. Washington, DC, 111 p.
- EV World, 2002, Republican Charges Price Fixing: EV World, People & Technology. Reuters, April 24, 2002. <http://www.evworld.com/databases/shownews.cfm?pageid=news240402-07>. (10/8/2002).
- FAO, 1998, Food Balance Sheet: <http://armanncorn:98ivivsub@faostat.fao.org/lim...ap.pl?> (10/10/1998)
- FAO, 1999, Agricultural Statistics: <http://apps.fao.org/cgi-bin/nph-db.pl?subset=agriculture>. Food and Agriculture Organization, UN. (11/22/1999)
- Ferguson, A., 2003, Implications of the USDA 2002 update on ethanol from corn: The Optimum Population Trust, Manchester, U.K., in press.
- Fertilizer., 2002, Fertilizer Use and Abuse: Land Use and Environmental Change in the Thompson-Okanagan. <http://royal.okanagan.bc.ca/mpidwin/agriculture/fertilizer.html>. (9/3/2002).
- Fuel's Gold., 2002, Fuel's Gold: ADM's Million-Dollar Soft Money Donations Help the Ethanol Tax Break Survive: <http://www.commoncause.org/publications/fuelsgold.toc.htm>. (9/18/2002).
- Giampietro, M., Ulgiati, S., and Pimentel, D., 1997, Feasibility of large-scale biofuel production: *BioScience*, v. 47, no. 9, p. 587-600.
- Hodge, C., 2002, Ethanol use in US gasoline should be banned, not expanded: *Oil & Gas Journal*, v. 100, no. 37, p. 20-30.
- Hoffman, T. R., Warnock, W. D., and Hinman, H. R., 1994, Crop Enterprise Budgets, Timonthy-Legume and Alfalfa Hay, Sudan Grass, Sweet Corn and Spring Wheat under Rill Irrigation, Kittitas County, Washington: Farm Business Reports EB 1173, Pullman, Washington State Univ., 97 p.
- Hulsbergen, K. J., Feil, B., Bierman, S., Rathke, G. W., Kalk, W. D., and Diepenbrock, W., 2001, A method of energy balancing in crop production and its application in a long-term fertilizer trial: *Agri., Ecosystems and Environ.*, v. 86, no. 4, p. 303-321.
- Kim, Y., 2002, World exotic diseases, in Pimentel, D., ed., *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species*: CRC Press: Boca Raton, FL, p. 331-354.
- Kuby, W. R., Markoja, R., and Nackford, S., 1984, Testing and Evaluation of On-Farm Alcohol Production Facilities: Acures Corporation, Industrial Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH. 100 p.
- Larsen, K., Thompson, D., and Harn, A., 2002, Limited and Full Irrigation Comparison for Corn and Grain Sorghum: <http://www.Colostate.edu/depts/prc/pubs/pl.pub.pdf>. (9/2/2002).
- Lieberman, B., 2002, The Ethanol Mistake: One Bad Mandate Replaced by Another: Competitive Enterprise Institute. <http://www.nationalreview.com/comment/comment-lieberman031202.shtml>. (9/17/2002).
- NAS, 2003, *Frontiers in Agricultural Research: Food Health, Environment Communities*: National Academy of Sciences, Washington, DC, 239 p.
- NASS, 1999, National Agricultural Statistics Service. Internet: <http://usda.mannlib.cornell.edu>. (8/30/2002).
- National Center for Policy Analysis., 2002, Ethanol Subsidies: Idea House. National Center for Policy Analysis. <http://www.ncpa.org/pd/ag/ag6.html>. (9/09/2002).
- NPRA, 2002, NPRA Opposes Ethanol Mandate; Asks Congress not to Hinder Efforts to Maintain Supply: National Petrochemical & Refiners Association, Washington, DC. <http://npradc.org/press/6-14-00.html>. (9/17/2002).
- Pimentel, D., 1980, *Handbook of Energy Utilization in Agriculture*: CRC press: Boca Raton, FL, 475 p.
- Pimentel, D., 1991, Ethanol fuels: Energy security, economics, and the environment: *Jour. Agri. and Environ. Ethics* v. 4, no. 1, p. 1-13.
- Pimentel, D., 1998, Energy and dollar costs of ethanol production with corn: *Hubbert Center Newsletter #98/2*. M. King Hubbert Center for Petroleum Supply Studies, Colorado School of Mines, Golden, CO. 7 p.
- Pimentel, D., 2001, The limitations of biomass energy, in *Encyclopedia on Physical Science and Technology*: Academic Press, San Diego. CA. p. 159-171.
- Pimentel, D., 2002, Soil erosion: a major environmental threat. manuscript.
- Pimentel, D., and Pimentel, M., 1996, *Food, Energy and Society*: Colorado Univ. Press, Boulder, CO, 363 p.
- Pimentel, D., Bailey, O., Kim, P., Mullaney, E., Calabrese, J., Walman, L., Nelson, F., and Yao, X., 1999, Will the limits of the Earth's resources control human populations?: *Environ., Develop., and Sust.*, v. 1, no. 1, p. 19-39.
- Pimentel, D., Doughty, R., Carothers, C., Lamberson, S., Bora, N., and Lee, K., 2002, Energy inputs in crop production: comparison of developed and developing countries, in Lal, R., Hansen, D., Uphoff, N., and Slack, S., eds., *Food Security & Environmental Quality in the Developing World*. CRC Press, Boca Raton, FL, p. 129-151.
- Pimentel, D., Harvey, C., Resosudarmo, P., Sinclair, K., Kurz, D., McNair, M., Crist, S., Sphritz, L., Fitton, L., Saffouri, R., and Blair, R., 1995, Environmental and economic costs of soil erosion and conservation benefits: *Science* v. 276, no. 5315, p. 1117-1123.
- Pimentel, D., Houser, J., Preiss, E., White, O., Fang, H., Mesnick, L., Barsky, T., Tariche, S., Schreck, J., and Alpert, S., 1997, Water resources: agriculture, the environment, and Society: *BioScience* v. 47, no. 2, p. 97-106.
- Pimentel, D., McLaughlin, L., Zepp, A., Kakitan, B., Kraus, T., Kleinman, P., Vancini, F., Roach, W. J., Graap, E., Keeton, W. S., and Selig, G., 1993, Environmental and economic effects of reducing pesticide use in agriculture: *Agri. and Ecosystems Environ.*, v. 46, no 1-4, p. 273-288.
- Pimentel, D., Warneke, A. F., Teel, W. S., Schwab, K. A., Simcox, N. J., Ebert, D. M., Baenisch, K. D., and Aaron, M. R., 1988, Food versus biomass fuel: socioeconomic and environmental impacts in the United States, Brazil, India, and Kenya: *Adv. in Food Res.*, v. 32, p. 185-238.
- PRB., 2001, *World Population Data Sheet: Population Reference Bureau*, Washington, DC, 2 p.
- Schneider, S. H., Rosencranz, A., and Niles, J. O., 2002, *Climate Change Policy Change*: Island Press, Washington, DC. 402 p.
- Shapouri, H., Duffield, J. A., and Wang, M., 2002, *The Energy Balance of Corn Ethanol: An Update*: USDA, Office of Energy Policy and New Uses, Agricultural Economics. Report No. 813, 14 p.

- Slesser, M., and Lewis, C., 1979, *Biological Energy Resources*: Halsted, New York, 192 p.
- Soil Fertility Guide, 2002, *Soil Fertility Guide*: <http://www.gov.mb.ca/agriculture/soilwater/soilfert/fbd02s09.html>. (9/2/2002).
- Sparks Commodities, 1990, *Impacts of the Richardson Amendment to H. R. 3030 on the U.S. Agricultural Sector*: Sparks Commodities, Inc., McLean, Va. Washington, DC Division, 3 p.
- Spirits Low, 1999, *Spirits Low as Brazil Alcohol Car in Trouble Anew*: Reuters Limited, November 22, 1999.
- Stanton, T. L., 1999, *Feed Composition for Cattle and Sheep*: Colorado State Univ., Cooperative Extension. Report No. 1.615, 7 p.
- USBC, 2001, *Statistical Abstract of the United States 2001*: U.S. Bureau of the Census, U.S. Government Printing Office, Washington, DC, 987 p.
- USDA, 1991, *Corn-State, Costs of Production*: U.S. Department of Agriculture, Economic Research Service, Economics and Statistics System, Washington, DC, 133 p. Stock #94018.
- USDA, 1997a, *1997 Census of agriculture*. U.S. Department of Agriculture. <http://www.ncfap.org>. (8/28/2002).
- USDA, 1997b, *Farm and Ranch Irrigation Survey, 1998: 1997 Census of Agriculture*. v. 3, Special Studies, Part 1. 280 p.
- USDA, 2001, *Agricultural Statistics*: U.S. Department of Agriculture, Washington, DC. USDA. I—1—XV-34 p.
- Wereko-Brobby, C., and Hagan, E. B., 1996, *Biomass Conversion and Technology*: John Wiley & Sons, Chichester, 203 p.
- WHO, 2000, *Malnutrition Worldwide*: http://www.who.int/nut/malnutrition_worldwide.htm (7/27/2000).
- Youngquist, W., 1997, *GeoDestinies: The Inevitable Control of Earth Resources Over Nations and Individuals*: National Book Company, Portland, OR. 499 p.


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No. 1603

October 16, 2002

ETHANOL PRODUCERS GET A HANDOUT FROM CONSUMERS

ERIN M. HYMEL¹

Members of the House and Senate are meeting in conference to reconcile the differences between their versions of comprehensive energy legislation (H.R. 4). An issue of significant concern is a federal mandate in Title VIII of the Senate-passed version of the bill² that would nearly triple the use of ethanol by 2012. Ethanol is a corn-based additive that serves as a fuel oxygenate.³ Fuel oxygenates are required in certain areas of the country with excessive carbon monoxide or ozone pollution, as mandated by the Clean Air Act.⁴ In short, this provision would grant ethanol a “captive” market.

Many feel the ethanol provision is essentially a deal forged between oil companies and the corn lobby that has won the support of the White House and Senate Majority Leader Thomas Daschle (D-SD),⁵ despite ethanol’s economic and environmental drawbacks. Based on the available evidence, it is

clear that mandating additional fuel-ethanol subsidies and use is entirely unnecessary.

There is no justification for including any such provision in a national energy policy, either now or in the future.

The chief reason for imposing an ethanol program on motorists is to enrich farmers and food processors under the guise of environmental enhancement.

Ethanol is not environmentally safe. Oxygenates

Produced by the
Thomas A. Roe Institute for
Economic Policy Studies

Published by
The Heritage Foundation
214 Massachusetts Ave., NE
Washington, DC
20002-4999
(202) 546-4400
<http://www.heritage.org>



This paper, in its entirety, can be found at: www.heritage.org/research/energyandenvironment/bg1603.cfm

1. The author wishes to thank Charli Coon, Senior Policy Analyst for Energy and Environment in the Thomas A. Roe Institute for Economic Policy Studies at The Heritage Foundation, for her significant contribution to this paper.
2. On August 2, 2001, the House passed H.R. 4 (Securing America’s Future Energy Act of 2001); on April 25, 2002, the Senate incorporated S. 517 (Senate Amendment 2917) into H.R. 4, Title VIII (Energy Policy Act of 2002).
3. Brent D. Yacobucci and Jasper Womach, “Fuel Ethanol: Background and Public Policy Issues,” *CRS Report for Congress* RL30369, Congressional Research Service, February 21, 2002.
4. *Ibid.*
5. Zachary Coile, “Senate Oks Ethanol-Rich Energy Bill; Boxer, Feinstein Say State’s Gas Prices Will Increase,” *San Francisco Chronicle*, April 26, 2002; see also editorial, “A Stealth Gas Tax,” *The Wall Street Journal*, April 15, 2002.

such as ethanol may reduce emissions of carbon monoxide (CO) and other volatile organic compounds (VOCs), but can also result in increased emissions of nitrogen oxides (NOx), a main precursor of smog pollution; and ethanol-blended gasoline can lead to increased emissions of acetaldehyde, a toxic pollutant.

A study by Cornell University scientist David Pimentel shows that producing ethanol from corn actually requires more energy than the fuel produces, making the United States more fossil-fuel-dependent, not less.⁶

The ethanol mandate amounts to blatant “corporate welfare.” Only a handful of large agribusinesses would gain from this ethanol mandate.

Mandating an increase in the use of ethanol would burden both taxpayers and consumers. Expensive production costs, lengthy transportation times, further infrastructure construction, and added blending/production procedures would be absorbed by consumers paying higher prices at the pump.

A BURDEN ON TAXPAYERS AND CONSUMERS

Ethanol is more expensive to produce than gasoline and costs about twice as much as gasoline.⁷ Over the years, the federal government has adopted various policies to encourage its use, including a tax

incentive that partially exempts ethanol-blended fuels from the standard excise tax on gasoline.⁸

Currently, ethanol-blended fuels receive a 5.3 cent per gallon exemption from the excise tax.⁹ This represents a federal subsidy of 53 cents per gallon of pure ethanol.¹⁰ Yet, despite this preferential tax treatment, use of ethanol has failed to expand significantly.¹¹ Clearly, ethanol’s failure to penetrate the marketplace explains the push by the ethanol industry and its friends in Congress to award ethanol a guaranteed market share.¹²

The ethanol provision included in Title VIII of the Senate-passed version of H.R. 4 would increase the price of gasoline by 4 to 10 cents per gallon throughout the United States, essentially burdening consumers with a “new gas tax.”¹³ Mandating an increase in the use of ethanol would burden both taxpayers and consumers. While taxpayer dollars would be used to pay even higher subsidies to a handful of companies that control the ethanol market,¹⁴ consumers would be saddled with price increases at the pump.

SIPHONING FUNDS FROM THE HIGHWAY TRUST FUND

Financing for the Highway Trust Fund (HTF) is derived from a variety of federal highway user taxes including excise taxes on motor fuels.¹⁵ Under current law, an ethanol-blended fuel, gasohol,¹⁶ is exempt from 5.3 cents of the federal excise tax on

6. See David Pimentel, “Limits of Biomass Utilization,” College of Agriculture and Life Sciences, Cornell University, Ithaca, New York, August 16, 2000 (in manuscript); also see Pimentel’s essay in *Encyclopedia of Physical Science and Technology*, Third Edition (San Diego: Academic Press, September 2001), Vol. 2, pp. 159–171.
7. Ben Lieberman, “The Ethanol Mistake: One Bad Mandate Replaced by Another,” Op-Ed in *National Review Online*, March 12, 2002.
8. Committee Memo, background on hearing on “Long-term Outlook on Highway Trust Fund: Are Fuel Taxes a Viable Measure?” Subcommittee on Highways and Transit, Committee on Transportation and Infrastructure, U.S. House of Representatives, July 16, 2002, p. 2, at <http://www.house.gov/transportation/highway/07-16-02/07-16-02memo.html> (September 12, 2002).
9. Yacobucci and Womach, “Fuel Ethanol: Background and Public Policy Issues,” p. 9.
10. *Ibid.*
11. Lieberman, “The Ethanol Mistake.”
12. *Ibid.*
13. Senator Hillary Clinton (D–NY), *Congressional Record*, April 11, 2002, p. S2570.
14. *Ibid.*
15. In addition to excise taxes on motor fuels, the Highway Trust Fund is financed with truck-related taxes on truck tires, sales of trucks and trailers, and the use of heavy vehicles. See Committee Memo, hearing on “Long-term Outlook on Highway Trust Fund: Are Fuel Taxes a Viable Measure?” p. 1.

NOTE: Nothing written here is to be construed as necessarily reflecting the views of The Heritage Foundation or as an attempt to aid or hinder the passage of any bill before Congress.

motor fuels. This represents a more than 25 percent break from the standard 18.4 cent excise tax on gasoline. An additional 2.5 cents of the tax received on each gallon is transferred to the General Fund instead of the HTF.¹⁷ Thus, the total loss to the HTF resulting from ethanol-blended fuels as compared to gasoline is 7.8 cents per gallon.¹⁸

In fact, in July 2002, House Transportation Committee leaders sent a letter to energy bill conferees, stressing the negative effect of ethanol subsidies on the Highway Trust Fund.¹⁹ The letter specifies that

Due to ethanol's federal tax incentive, purchasers of gasohol... contribute less to the maintenance and improvement of the nation's highway and transit systems than do purchasers of gasoline.... Currently, the combined effect of these separate policies results in well over \$1 billion per year in foregone Highway Trust Fund revenues.²⁰

Currently, approximately 1.7 billion gallons of the 2.0 billion gallons of ethanol produced in the United States each year are consumed.²¹ Title VIII of the Senate-passed version of H.R. 4 would nearly triple the use of ethanol by 2012, with increases of 2.3 billion gallons by 2004 and 5.0 billion gallons by 2012.²² While the current tax exemptions for ethanol-blended gasoline already have a significant negative impact on the Highway Trust Fund, this mandate to increase ethanol use by nearly 200 per-

cent would result in an even greater depletion of highway funds.

At a House Subcommittee on Highways and Transit hearing on fuel taxes, Dr. Peter Ruane, President and CEO of the American Road and Transportation Builders Association, testified that ethanol exemptions would reduce funding to the Highway Trust Fund by approximately \$4 billion by 2012.²³ Some estimates are even larger. A comprehensive study by Hart Downstream Energy Services reports that "The level of ethanol blending stipulated in [the Senate-passed version of H.R. 4] would reduce [Highway Trust Fund] receipts by approximately \$10 billion over the aggregate cost associated with continued use of ethanol under current regulations over the same period."²⁴

Others have warned of the devastating impact of legislated market manipulation as well. For example, Marlo Lewis, Jr., of the Competitive Enterprise Institute predicts that

Starting in 2013, the mandate requires refiners to increase the 5 billion gallon target to guarantee ethanol a fixed market share as the nation's overall fuel usage expands.... [T]ripling the sale of ethanol will diminish highway trust fund revenues.... States will not be able to afford new roads, bridges, and other critical infrastructure projects needed to relieve congestion and improve auto safety.²⁵

16. Gasohol, also known as E10, is a blend of gasoline with up to 10 percent ethanol and constitutes 99.7 percent of the fuel ethanol consumed in the United States.

17. Committee Memo, hearing on "Long-term Outlook on Highway Trust Fund: Are Fuel Taxes a Viable Measure?", p. 2.

18. *Ibid.*

19. House Committee on Transportation and Infrastructure, "Transportation Committee Leaders Urge Energy Conferees to Address Ethanol Provision's Impact On Highway Trust Fund; Senate Version of Energy Bill Will Cost Trust Fund an Estimated \$4 Billion Per Year by 2012," July 29, 2002.

20. House Committee on Transportation and Infrastructure, Letter to Energy Conferees.

21. Yacobucci and Womach, "Fuel Ethanol: Background and Public Policy Issues," p. 5.

22. *Ibid.*, p. 20.

23. House Committee on Transportation and Infrastructure, press release, "Transportation Officials Outline Changes Needed to Ensure a Viable Highway Trust Fund; Ethanol Blend Fuel Tax Exemptions & General Fund Diversions Accounted for \$1.1 Billion Less in Highway Improvements for States in 2001," July 16, 2002.

24. Hart Downstream Energy Services Report, Highway Trust Fund Analysis, *Impact of S. 517 on the Highway Trust Fund*, April 25, 2002, p. 4.

25. Marlo Lewis, Jr., "Heed Hillary's Herald," Op-Ed in *Tech Central Station*, May 8, 2002.

The proposed ethanol mandate will certainly leech needed funds from the Highway Trust Fund, which enables states to keep our nation's critical transportation infrastructure viable. This potential drain on the Highway Trust Fund is yet another significant price that the nation would pay for this irresponsible mandate.

LACK OF INFRASTRUCTURE TO TRANSPORT ETHANOL FUEL

At present, the infrastructure needed to produce, store, and blend more ethanol does not exist. Given that it is most cost-effective to produce ethanol close to its source—corn—approximately 90 percent of the nation's ethanol is produced in five states: Illinois, Indiana, Iowa, Minnesota, and Nebraska.²⁶ Likewise, the greatest use of ethanol-blended fuel is currently in the Midwest.²⁷

Providing other regions of the country with ethanol-blended gasoline would increase its cost, since additional transmission and distribution lines would be needed to transport blended fuel to these areas. Given that ethanol cannot be transmitted through petroleum pipelines, the costs of transporting ethanol to other regions of the country will be high.²⁸ Ethanol will have to be transported to other regions by truck, rail, or barge and then blended at a local production facility.²⁹

Nationwide use of fuel ethanol would not be cost-effective. The availability and price of ethanol-blended fuel would be affected by lengthy transportation times, further infrastructure construction,

and added blending/production procedures. Consumers would be sure to pay more per gallon at the gas station as a result of this legislation. The California Energy Commission reports that states in which ethanol is not produced, including California, could suffer gas prices as high as \$4.00 per gallon.³⁰ Thus, while large and profitable agribusiness gained from a legislated demand for their byproducts, taxpayers and consumers would bear the burden.³¹

ETHANOL'S ENVIRONMENTAL DRAWBACKS

Contrary to widespread misconception, ethanol is not environmentally safe, nor does it necessarily reduce poisonous emissions. While oxygenates such as ethanol do reduce emissions of carbon monoxide (CO) and other volatile organic compounds (VOCs), they can also result in increased emissions of nitrogen oxides (NO_x), a main precursor of smog pollution.³² In addition, ethanol can increase the likelihood that toxins found in gasoline, such as benzene, will seep into groundwater.³³

During floor debate, Senator Dianne Feinstein (D-CA) noted that the "evidence suggests that...reformulated gasoline with ethanol produces more smog pollution than reformulated gas without it."³⁴ Senator Feinstein also cited a 1999 National Academy of Sciences report, which found that "[ethanol-blended gasoline] will lead to increased emissions of acetaldehyde" (a toxic pollutant).³⁵

26. Yacobucci and Womach, "Fuel Ethanol: Background and Public Policy Issues," p. 4.

27. *Ibid.*

28. *Ibid.*

29. *Ibid.*

30. Senator Dianne Feinstein (D-CA), *Congressional Record*, April 11, 2002, p. S2508.

31. As Cato Institute analyst Jerry Taylor writes, "Oxygenated fuel mandates are a thinly disguised handout to corn farmers, who produce the oxygenate (ethanol) relied upon by the Midwestern market. But ethanol is even more expensive to produce than other oxygenates and it can't be shipped through pipelines." Jerry Taylor, "Bad Policies Fuel Midwest Gasoline Prices," *Chicago Tribune*, June 21, 2000.

32. Yacobucci and Womach, "Fuel Ethanol: Background and Public Policy Issues," p. 11, and Senator Dianne Feinstein, *Congressional Record*, April 11, 2002, p. S2510.

33. Lewis, "Heed Hillary's Herald."

34. Senator Dianne Feinstein, *Congressional Record*, April 11, 2002, p. S2510.

35. National Academy of Sciences, *Ozone-Forming Potential of Reformulated Gasoline*, Executive Summary, p. 7, 1999, at www.nap.edu/books/0309064457/html/ (October 8, 2002).

CORPORATE WELFARE: SUBSIDIES AND PROTECTIONS

The greatest beneficiaries of the ethanol mandate in the Senate-passed version of H.R. 4 would be the handful of companies that control the ethanol market. Many experts feel that the ethanol mandate in the Senate legislation's Title VIII amounts to blatant "corporate welfare."³⁶

Of the companies producing ethanol, the top five produce almost 60 percent and the top 10 produce approximately 75 percent of the chemical.³⁷ One company alone, Archer Daniels Midland, currently produces 41 percent of the nation's ethanol.³⁸ Reacting to subsidies targeted to this industry, Senator Charles Schumer (D-NY) declared, "Our citizens' health and the environment are being held hostage to the desire of the ethanol lobby to make ever larger profits."³⁹

Not only does Title VIII of the Senate-passed version of H.R. 4 award these companies more subsidies by means of a mandate that would almost triple ethanol use, but it also awards them a "Renewable Fuels Safe Harbor" provision that protects big agribusiness from environmental liability by "protecting industry from suits arising out of defective additives in gasoline...."⁴⁰ Senator Schumer states it best:

The Safe Harbor provision gives unprecedented product liability protection against consumers and communities that seek legal redress from the manufacturers and oil companies that produce and utilize

defective additives in their gasoline. Not just ethanol; all of them.⁴¹

INSIGNIFICANT CONTRIBUTION TO NATIONAL ENERGY SECURITY

Mandating an increase in the use of fuel-blended ethanol will not contribute to the nation's energy security. Although ethanol has been touted as a "renewable resource," this is not the case. In the course of its production, fuel ethanol must be denatured through a process that uses gasoline.⁴² This raises production costs, significantly devalues ethanol as a renewable resource, and contributes very little to the United States' energy security.

According to the Congressional Research Service, some studies suggest that

the amount of energy needed to produce ethanol is roughly equal to the amount of energy obtained from its combustion, which could lead to little or no reductions in fossil energy use. Thus, if the energy used in ethanol production is petroleum-based, ethanol would do nothing to contribute to energy security.⁴³

Similarly, a recent study by Cornell University scientist David Pimentel shows that producing ethanol from corn actually requires more energy than the fuel produces, thereby making the United States more fossil-fuel-dependent, not less.⁴⁴ Professor Pimentel's study explains that the amount of energy required to produce 1,000 liters of ethanol is approximately 70 percent more than the amount of energy that the ethanol possesses.⁴⁵

36. For example, Marlo Lewis, Jr., of the Competitive Enterprise Institute calls the ethanol mandate "flagrant corporate welfare, transferring billions of dollars from working families to a handful of big companies." Lewis, "Heed Hillary's Herald."

37. The 10 companies producing 75 percent of domestic ethanol are Archer Daniels Midland (ADM), Minnesota Corn Processors, Williams Energy Services, Cargill, New Energy Corporation, Midwest Grain Products, High Plains Corporation, Chief Ethanol, Ag Processing, Inc. AGP, and A. E. Staley.

38. Senator Dianne Feinstein, *Congressional Record*, April 11, 2002, p. S2509.

39. Senator Charles F. Schumer (D-NY), *Congressional Record*, April 11, 2002, pp. S2512-S2513.

40. Editorial, "Ethanol's Ambitions," *The Washington Post*, April 16, 2002.

41. Senator Charles F. Schumer, *Congressional Record*, April 11, 2002, p. S2513.

42. Yacobucci and Womach, "Fuel Ethanol: Background and Public Policy Issues," pp. 3-4.

43. *Ibid.*, p. 13.

44. Pimentel, "Limits of Biomass Utilization."

45. *Ibid.*, p. 11.

CONCLUSION

As Senate and House conferees meet to reconcile their respective energy bills, they must be clear about what a mandate for increased subsidies and use of ethanol-blended fuel would and would not do. This mandate clearly defines its winners and losers. Ethanol use neither helps the environment nor improves the nation's energy security. Ethanol is not environmentally friendly and is not an authentic renewable resource; its production may require more energy than the fuel it produces.

Finally, ethanol is not economically advantageous. Mandated increased use would entail additional production costs, transportation costs,

infrastructure costs, and environmental costs, the burden of which would fall squarely on consumers.

The ethanol provision in the Senate-passed version of H.R. 4 would simply subsidize a small group of large ethanol producers at the taxpayer's expense. Mandating the use of more fuel ethanol is both costly and unnecessary. The evidence clearly shows that there is no justification for including any such provision in America's national energy policy, either now or in the future.

—*Erin M. Hymel is a research assistant in the Thomas A. Roe Institute for Economic Policy Studies at The Heritage Foundation.*



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February 11, 2003

Governor James Doyle
Office of the Governor
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Dear Governor Doyle,

Like many local elected officials in Wisconsin, I was pleased at the prospect of an ethanol plant coming into our rural area. I believed that it was a clean industry that would be good for farmers and create local jobs while easing the burden that imported oil places on our economy.

With these optimistic feelings about ethanol, I attended an informational meeting in the village of Rio last April where my representative, Eugene Hahn, and a former chemical engineer with the Department of Energy spoke about ethanol. After that meeting I knew I needed to learn more before I was comfortable supporting ethanol plants in our area.

Subsequently, I began studying ethanol. I also began receiving calls and visits from area residents who had become independently interested in this topic. Much of what we were learning forced me to re-think my ethanol stance. I no longer feel that it is a clean industry or a good local employer, nor do I believe it is a reasonable way to reduce foreign oil dependence. Furthermore, I believe that there are very serious environmental and health and safety issues, primarily in the areas of groundwater consumption, toxic spills, and air pollution. Because of the corporate dominance of the ethanol industry, ethanol also further threatens our Wisconsin family farms.

Attached is a paper delineating areas of concern that I hope your administration will consider before continuing or increasing public policy that supports ethanol production in Wisconsin. At the very least, I hope that you will remove the current \$3 million state ethanol subsidy until there has been a rational debate about ethanol.

I thank you for your time and attention to this issue.

Sincerely and with best wishes for you and your administration.

Meagan Yost

Cc w/ Attachments: Secretary of Natural Resources
Secretary of DATCP
Secretary of Health and Family Services
Senate Committee on Agriculture, Financial Institutions and Insurance
Senate Committee on Environment and Natural Resources
Assembly Committee on Agriculture
Assembly Committee on Natural Resources
Jordy Jordahl

Ethanol in Wisconsin: Policy makers and decision makers in Wisconsin need unbiased information about ethanol

Powerful special interest groups promote the benefits of ethanol production. Primary among them are Archer Daniels Midland (ADM) and the national and state Corn Growers Associations. ADM dominates the market, producing over 40% of domestic ethanol. The industry, through lobbies such as the Renewal Fuels Association (RFA), ADM and the Corn Growers, exerts tremendous political influence, spends millions of dollars lobbying at state and federal levels and relentlessly pushes for expanded ethanol subsidies. The popularly held view, which is driven by a sophisticated and well-funded pro-ethanol public relations effort, is that ethanol is environmentally friendly and ethanol plants provide jobs, tax revenue and higher corn prices for farmers. But is this the real ethanol picture?

The BIG Question Is: Who wins and who loses with ethanol?

The primary beneficiaries of an ethanol plant are the corporate investors who collect public subsidies. Although it is commonly stated that ethanol plants increase local corn prices, the best available data¹ shows this is not true. Increasingly, experts are recognizing that ethanol plants pose serious local public health and safety risks as well as environmental liabilities. The issues are complex. Local decision makers are often overwhelmed and almost always have difficulty obtaining a balanced picture of the pros and cons of ethanol.

Air

The ethanol industry's claims of ethanol benefits do not withstand scientific scrutiny. The best scientific evidence shows that ethanol use does not result in cleaner air. Tailpipe emissions from vehicles using ethanol-added gasoline actually contribute to smog. Studies show that as the ethanol is added to gasoline, vehicle miles per gallon go down.

The Minnesota Department of Health began investigating air emissions from the Gopher State Ethanol plant in St. Paul because of so many health-related complaints from its neighbors. The Environmental Protection Agency (EPA) also did studies. Many of the pollutants found in the new studies had not been previously tested for and were not formerly associated with ethanol production. The findings of these studies need to be used in the permitting and monitoring process for all ethanol plants.

Neither the Wisconsin DNR nor the EPA have adequate resources to conduct meaningful air and water quality monitoring tests that will protect the health, welfare, and natural resources of Wisconsin's people and communities. With budget shortfalls at the federal and state levels, it is naïve to assume that additional staff and resources will be made available for this important work.

In April 2002, the EPA stated that "most, if not all" ethanol plants were releasing "many times more" air emissions than they were permitted to release. Of particular concern are high levels of particulate organic matter (POM) and volatile organic compounds (VOCs), especially several known carcinogens contained in the VOCs. Most plants remain substantially out of compliance, exposing the surrounding communities to elevated health risk. Because the EPA has been slow to enforce its own regulations and protect the public safety, the Sierra Club has recently brought a suit against two plants, which it describes as the "tip of the iceberg".

Water

Ethanol production uses huge volumes of water, potentially threatening ground and surface water levels and municipal water sources. Most of this water is lost as steam during distillation or exported as ethanol and is not returned to the local aquifer. At ethanol plants in Minnesota and Iowa, there have been numerous instances of spills leading to stream pollution.

Energy

Ethanol doesn't make a meaningful contribution to energy security and may actually be counter-productive because it diverts resources from effective programs¹. It does not improve the balance of trade, and costs US consumers about \$2 billion a year more than the equivalent volume of imported oil.

Growing and transporting corn needed for ethanol production demands large inputs of fossil fuels in the form of fertilizers, diesel and gasoline. It also involves transporting and storing numerous hazardous materials such as sulfuric acid.

Most of the plants being proposed in Wisconsin are 40-million-gallon/year plants, such as the one currently operating in Monroe. These plants pump about 500,000 gallons of water per day from the local aquifer and heat it to boiling using natural gas. This amount of natural gas would heat tens of thousands of Wisconsin homes. A number of leading scientists suggest that when all inputs are accounted for, corn ethanol yields a net energy loss.

Farmers and Farm Communities

Profitable ethanol production is predicated on cheap corn and public subsidies. Ethanol plants are located on rail lines so cheap corn from outside the local area can be used in the plants if the price is right. A 40-million-gallon/year ethanol plant requires 14.3 million bushels of corn annually. Corn production to supply ethanol plants requires large-scale industrial agriculture that does not support family farms or farm communities. Furthermore, this type of production is not environmentally sustainable. Wisconsin needs diversification in agriculture, not increased monoculture corn for ethanol. A byproduct of ethanol production is distiller's grain, sold as animal feed, which depresses the market for more environmentally friendly livestock feed crops such as soybeans and alfalfa.

Ethanol Subsidies

The federal subsidy for ethanol production is now \$0.54 per gallon. Without this federal subsidy the ethanol industry would not exist because it could not profitably meet its production costs. Wisconsin is now offering an additional \$0.20 per gallon as a state subsidy. It's important to understand that the subsidies are not limited to the \$0.74 per gallon subsidy on ethanol production itself. Large corporate farms are the main suppliers of corn to ethanol plants. These producers are paid millions of dollars in federal corn subsidies. The taxpayer first is required to subsidize farmers to grow a surplus product and then is required to pay additional state and federal taxes to subsidize turning that surplus product into ethanol. Even the conservative Heritage Foundation in its October 2002 report² calls the subsidies and protections that Congress grants the ethanol industry "corporate welfare."²

To add insult to injury, ADM can then buy out local groups as most recently happened in Marshall, MN. According to an article in the *Minneapolis Star Tribune*:

Some Minnesota lawmakers are frustrated that the state provided \$33 million in ethanol-producer subsidies to a farmer-owned operation - only to see it become the biggest acquisition for Illinois-based ADM. And a federal judge has yet to review an antitrust challenge before he signs a consent decree approving the sale. ADM said Friday, January 24, it is confident the deal will be approved.

In mid-January, Minnesota Governor Pawlenty boldly proposed a cut in the state ethanol subsidy³. Although the political will may not yet be strong enough to achieve this cut, a healthy debate in Minnesota has brought many of the issues presented in this paper into the public forum. Minneapolis *Star-Tribune* columnist Steve Calvin sums it up in his op/ed which appeared in the January 24th issue of the newspaper, "Ethanol made from large-scale corn cropping is about as close to being a renewable resource as World Wrestling Federation wrestling is to being an Olympic event."

In addition to huge federal/state subsidies on ethanol production itself, there are many additional hidden public costs such as the sacrifice of good farmland for the facility sites, considerable public infrastructure and the associated long-term maintenance costs, the consumption of vast amounts of water and natural gas and the frequent use of a TIF district. As witnessed by many in Wisconsin over the past 18 months, the greatest cost might be the scarring of stressed rural communities as the pro/anti-ethanol argument plays out in a community. Repeatedly across our state, this argument is falsely and deliberately framed as a pro/anti-agriculture issue. This does much to feed divisiveness and nothing to encourage the necessary rational informed debate.

Discover and Publish the Facts

Ethanol presents citizens and decision makers with complex and overlapping environmental, agricultural, social, and economic questions. It is not clear that the benefits come close to outweighing the costs. State and federal ethanol subsidies and institutional policies and biases must be examined. The permitting process must be updated to reflect the new air quality studies from Minnesota and the EPA as well as the expanding body of knowledge on groundwater draw down and its effects on water quality.

Before municipalities and communities can be expected to make decisions about allowing ethanol plant operations to proceed, the true costs and benefits of ethanol must be investigated thoroughly and made public. Before accepting promises from proponents and providing millions of dollars in subsidies, state and federal government should invest in unbiased research to determine the facts about ethanol production and use.

More Information

There have been a number of attempts to locate ethanol plants in Wisconsin communities. To date, only two have been successful. These proposed plants have led many local citizens to become informed on various aspects of ethanol. There are numerous websites, newspaper articles, scientific articles, and citizen groups to help inform public policy in the ethanol arena. Attached is a list of resource people, organizations, citizen groups, and websites to help inform the debate.

¹ Ethanol Programs – "A Program Evaluation Report", Minnesota Office of the Legislative Auditor, Report #97-04.

² Heritage Foundation Backgrounder: Ethanol Producers get a handout from Consumers, October 16, 2002. Available on line at:
<http://www.heritage.org/Research/EnergyandEnvironment/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=27029>

³ *Six St. Paul legislators seek to end payments to Gopher State Ethanol.* Conrad deFiebre. Minneapolis-St. Paul Star Tribune. Jan. 24, 2003.

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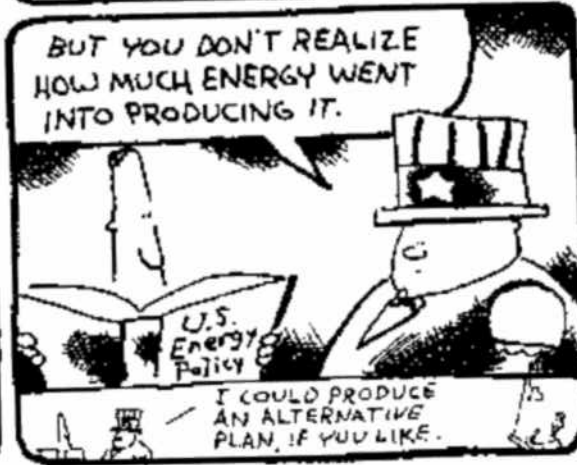
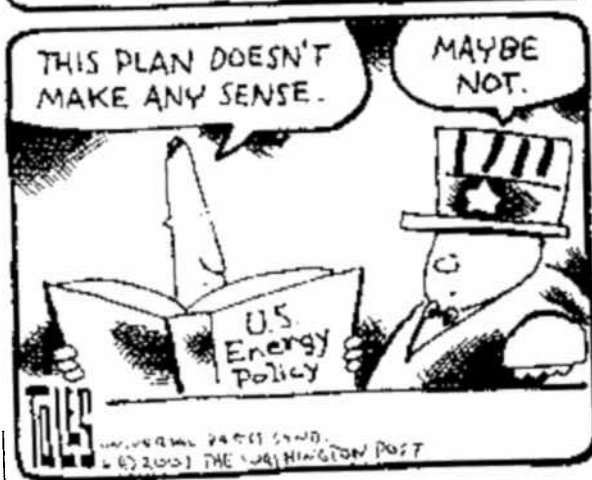
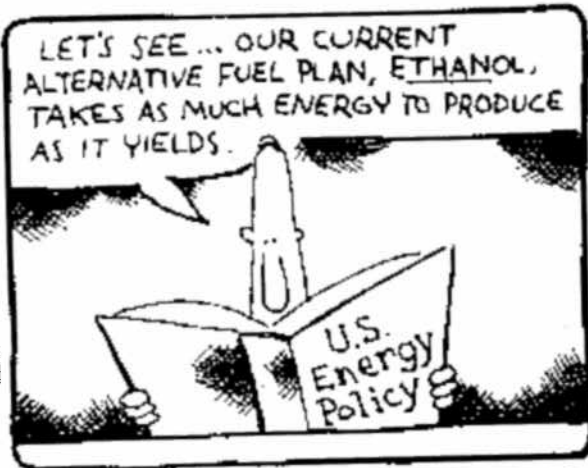
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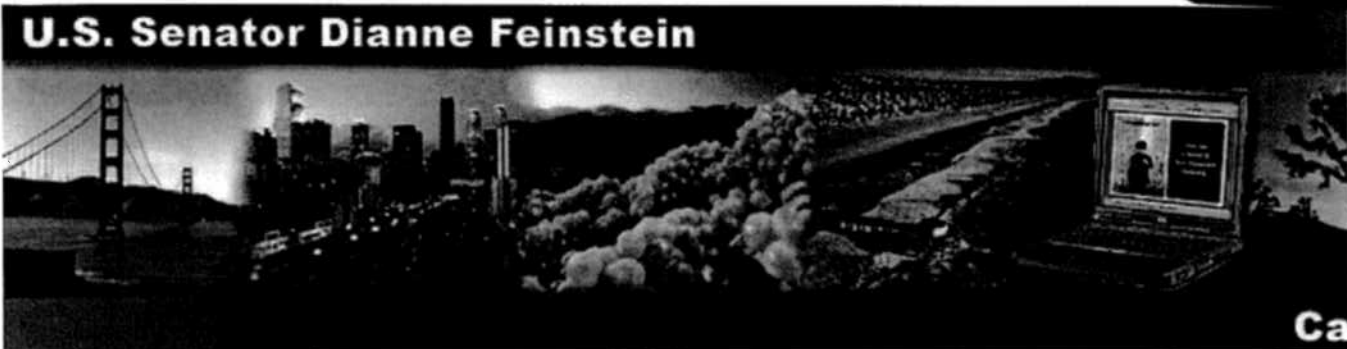
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Senator Feinstein Reiterates Call to EPA to Exem California from Federal Oxygenate Mandate

September 10, 2003

Washington, DC - U.S. Senator Dianne Feinstein (D-Calif.) has reiterated her request Environmental Protection Agency (EPA) to review and grant California a waiver to a fe mandate that requires the State to add oxygenates such as MTBE or ethanol to its gas

California has made repeated requests for an oxygenate waiver, but the EPA has sim dismissed its requests without fully considering the issue. However, on Thursday July 2003, the Ninth Circuit Court of

Appeals ruled that the Bush Administration violated the Clean Air Act when it rejected California's request to sell cleaner-burning gasoline without oxygenates such as MTB ethanol.

In the decision, the Ninth Circuit ordered the EPA to reconsider California's application waiver of the federal oxygen requirement in gasoline.

In a letter to Marianne Lamont Horinko, Senator Feinstein wrote: **"I believe that the Environmental Protection Agency no longer needs to review 'all available option since it is quite clear that California qualifies for a waiver from the federal oxyge requirement."**

The federal oxygenate requirement requires the State to use either MTBE or ethanol. State has banned MTBE because of serious groundwater concerns. As a result, ethan the only oxygenate available to the State.

The California Air Resource Board (CARB) studied the impacts of the switch from MT ethanol. Their studies revealed that ethanol would have detrimental economic and environmental impacts on the state. CARB's studies concluded that using ethanol to a the two percent oxygenate requirement would prevent or interfere with California's atta of the federal ozone and particulate matter standards.

"It has been seven weeks since [the Ninth Circuit Court Ruling]. I am disappoint the EPA has not yet decided to grant California's request for a waiver.

As you know, the Energy Bill is currently being considered by a conference committee. The conference committee will be deciding whether to rescind the fe oxygen mandate in return for a federal ethanol mandate. And I am concerned by inaction that would delay approval of California's waiver application.

The EPA has had plenty of opportunity to study the impacts of the waiver on California's air quality. In fact, California's Air Resource Board has provided its studies to the EPA that prove that the federal oxygen mandate is not required to

reduce emissions from gasoline. This data has been before the EPA since Gove Davis initially requested the waiver in 1999.

Furthermore, California implemented its own reformulated gasoline program in This program was designed to achieve maximum reductions in emissions of vol organic compounds, nitrous oxide, and other toxics. The Air Resource Board fo that the oxygenate requirement, on top of the State's more stringent air quality programs, would actually reduce the State's ability to achieve reductions in toxi emissions.

The California Air Resource Board most recently looked into the role of the oxyg requirement on air quality in Southern California this summer. As you know, bec of the Governor's phase out of MTBE, ethanol is currently the primary oxygenat being blended in California's gasoline supply. Ethanol is known to increase smo the summer months. Winston Hickox, Secretary of the California Environmental Protection Agency, concluded that:

'...our current best estimate is that the increase in the use of ethanol-blended ga has likely resulted in about a one percent increase in emissions of volatile orga gases (VOC) in the SCAQMD [South Coast Air Quality Management District] in t summer of 2003. Given the very poor air quality in the region and the great diffic reaching the current federal ozone standard by the required attainment date of 2 an increase of this magnitude is of great concern. Clearly, these emission increa have resulted in higher ozone levels this year that what would have otherwise occurred, and are responsible for at least some of the rise in ozone levels that h been observed.'

It is past time for the EPA to act. Again, I urge you to swiftly grant California a w from the federal oxygen requirement."

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**Testimony of A. Blakeman Early
On Behalf of the American Lung Association
before the Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety
Senate Environment and Public Work Committee
June 14, 2000**

Testimony of A. Blakeman Early, Environmental Consultant to the American Lung Association, before the Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety, Senate Environment and Public Works Committee, June 14, 2000

Good morning Mr. Chairman and members of the committee. My name is Blakeman Early. I am an environmental consultant appearing on behalf of the American Lung Association. I was invited to discuss the benefits and problems associated with the use of ethanol in gasoline under the Clean Air Act. While the American Lung Association has been accused of being anti-ethanol, we consider our position to be neither anti nor pro ethanol. Our view is that ethanol should be used in gasoline when it can help provide useful properties to reduce air pollution and it should be discouraged from being used if the result is increased air pollution. Ethanol in Gasoline Helps Reduce Carbon Monoxide (CO) Ethanol's greatest attribute is its ability to provide oxygen to the fuel which can reduce carbon monoxide. Therefore, the ALA supports the use of ethanol in the wintertime oxy-fuel program to help reduce unhealthy levels of carbon monoxide. The oxy-fuel program is mandatory under the Clean Air Act for areas that are classified "moderate" non-attainment for carbon monoxide. But as you know, the air pollution effort against CO is being won and the number of these areas is diminishing. This is due primarily to improvements in emissions control equipment on new cars. Ethanol helps to reduce CO tailpipe emissions from older vehicles. Ethanol Provides Clean Octane Ethanol is a good source of octane and contains no aromatics and modest levels of sulfur. These three attributes make it useful as a blending component in gasoline. As a result, refiners use ethanol to help achieve limits on toxic aromatics and sulfur in the RFG program. We anticipate refiners will also use ethanol to help meet sulfur limits in EPA's recently promulgated Tier II sulfur limits for conventional gasoline which begins in 2004.

~While ethanol can help achieve limits to aromatics and sulfur, they do not guarantee that result, which is in part why the ALA does not support mandatory use of ethanol in RFG. Looking at Figure B2, taken from the Blue Ribbon panel report, you can see that the RFG sold in Chicago in 1998 achieved among the smallest reduction of air toxics, despite the presence of 10 percent ethanol. \1\ Further, looking at the attached Figures 15, 16, and 17 taken from an analysis of 1996- 1998 gasoline quality, you can see that sulfur levels in RFG sold in Chicago in 1996 and 1997 were among the highest in the nation despite the use of ethanol. However, in 1998 sulfur levels in Chicago dropped by 40 percent even though oxygen mandate was still being met with relatively the same amounts of ethanol. \2\ Ethanol can help lower sulfur level but does not guarantee it.

\1\ ~ Achieving Clean Air and Water, The Report of the Blue Ribbon Panel on Oxygenates in Gasoline, September, 1999, p. 43.

\2\ An Analysis of 1996-98 Gasoline Quality in the United States, SAE 199-01-3584, October, 1999.

The findings above demonstrate why the ALA does not support mandating ethanol to achieve any other outcome besides CO reductions in the wintertime. The ALA and many environmental organizations supported a 2 percent oxygen requirement for RFG in the Clean Air Act Amendments of 1990 based on the assumption at the time such requirement would guarantee reductions of VOCs, and toxics. We now know we were

wrong. Clearly, the best way to obtain reductions of specific pollutants from gasoline is to mandate them - set performance standards - and let refiners meet such requirements however they choose to.

Ethanol Increases Gasoline Volatility

Now let me turn to the problems caused by mandating ethanol in gasoline. Quite simply the big problem with ethanol use in gasoline is that it significantly increases volatility when mixed in gasoline at levels above 2 percent by volume. Reducing gasoline volatility during hot summer weather is one of the most important strategies for improving summertime gasoline in order to reduce smog. That is because with the advance of pollution equipment on automobiles, evaporation of gasoline hydrocarbons is now a greater contributor to smog in most areas than the tailpipe hydrocarbon emissions. The volatility increases that ethanol causes in summertime can overwhelm any benefit it provides in reducing CO tailpipe emissions, sulfur dilution or aromatics dilution. That is why the ethanol industry only talks about the tailpipe emissions benefit from ethanol in RFG. The ethanol industry often quotes last year's National Research Council study of reformulated gasoline as finding that CO reduction credit should be included for ethanol in EPA's complex model for RFG because CO tailpipe emissions contribute to ozone formation. But they fail to acknowledge what we believe to be a more important finding. The NRC report stated, "...the increase in the evaporative emission from the ethanol-containing fuels was significantly larger than the slight benefit obtained from the lowering of the CO exhaust emissions using the ethanol-containing fuel."³ The NRC also acknowledged that ethanol increases NOX tailpipe emissions relative to non-ethanol containing fuel. These NOX emissions also contribute to greater ozone and particulate formation.⁴ The bottom line: the reduction in CO tailpipe emissions obtained by using ethanol in summertime gasoline are not worth the increase in evaporation and the increases in NOX tailpipe emissions from a smog contribution point of view. Incidentally, the increases in evaporation do not just contribute to ozone formation. Since the gasoline also contains toxic aromatics, such as benzene, these will evaporate more readily along with the ethanol. While ethanol may dilute the amount of benzene in a gallon of gasoline, the amount of benzene that ends up in the ambient air due to increased evaporation from the fuel may be greater than if the ethanol were not added at all.

³ Ozone-forming Potential of Reformulated Gasoline, May, 1999, p. 158.

⁴ California Environmental Protection Agency Air Resources Board, Air quality Impacts of the Use of Ethanol in California Reformulated Gasoline, December, 1999.

It is argued that if ethanol is mandated in RFG, air quality is protected because refiners are required to limit the volatility by the RVP limits of EPA's RFG regulations. Thus the impact of ethanol on volatility is not a factor. This is not true. First, while it is clear refiners can off-set the volatility effect of ethanol by blending it with super low volatility blend-stock, we do not know what potential air quality benefits may be lost by changing other parameters of the fuel to meet the RVP limit. For instance, a refiner might actually increase aromatics because they need a sulfur-free component that is low in volatility to help off-set volatility increases from using ethanol. For example, turning back to Table B2, if ethanol were required in RFG sold in Rhode Island where MTBE has been used to provide oxygen, the significant toxicity reductions achieved might decline to the same level achieved in Chicago as refiners increase aromatics to help off-set the volatility effect of the ethanol. Low Volatility RFG With Ethanol Can Cause Increased Evaporation of Fuel Even RFG with low RVP that contains ethanol may cause increases in evaporation compared to non-ethanol containing RFG in two ways: through increased permeation of "soft parts" in auto engines and also through co-mingling with ethanol free fuel.

EPA in its Tier 2 Final Rule identified permeation as a problem that can increase evaporation of gasoline. Essentially, alcohol in fuels promote the passage of hydrocarbons through the "soft products" in cars, such as

plastic fuel tanks, hoses, and "o" ring seals. As a result, all new cars subject to Tier evaporative emissions requirements have to demonstrate that they are using materials that resist the permeability effect by testing them with fuel containing 10% ethanol.⁵ But of course this does nothing to protect the vehicles on the road today. Only vehicles being made since approximately 1994 have been consistently using alcohol resistant soft materials. How much will an ethanol-containing RFG meeting RVP limits increase evaporation from vehicles on the road today? Probably a great deal. The Toyota Corporation presented test data to the California Air Resources Board that showed a high RVP fuel increased evaporation from gaskets, plastic fuel tubes and plastic gas tank material by 500, 1300, and 800 percent, respectively (See Tabs 1, 2, 3). Even if a fuel meeting RVP limits caused permeation at a half or quarter of the rate of the non-complying fuel tested, this would have a major adverse impact on vehicle evaporative emissions. This concern is of special relevance to a renewable fuel mandate that would apply in areas that are in non-attainment for ozone where conventional gasoline is used. I will discuss this in a moment.

⁵ See discussion at 64 Federal Register, 26084, May 13, 1999.

Ethanol Fuel Can Increase Volatility of Non-ethanol Fuels

Finally, I must note the impact that ethanol volatility can have through a mechanism referred to as "co-mingling". Essentially when two fuels with the same RVP, one ethanol free and one containing ethanol, are mixed together the volatility of the entire mix is substantially raised. In a circumstance where consumers purchase ethanol free fuel, use a portion and then purchase fuel with ethanol in it, even if the ethanol blend is low RVP RFG, volatility can raise as much as 8/10ths of a pound RVP⁶. In essence the adverse volatility effect of ethanol is not limited to the absolute volume sold in a given market area. It can be greatly magnified, depending how much consigners switch back and forth in purchasing the two types of fuels. Whenever the volume of ethanol in the gas tank exceeds 2 percent, the volatility of the entire tank-full of gasoline will be increased. The "co-mingling" might occur between ethanol containing RFG and conventional fuel among drivers who frequent the areas on the border between non-RFG and RFG areas; among purchasers of ethanol-containing and ethanol-free conventional gasoline in non-attainment areas for ozone; or even within an RFG area where there is ethanol-free and ethanol containing RFG. The volatility increases that could be caused by the permeation and co-mingling effects of ethanol in RFG, under some conditions, could potentially offset the entire lower volatility benefit of moving from Phase 1 RFG to Phase 2 RFG.

⁶ In-use Volatility Impact of Co-mingling Ethanol and Non-ethanol Fuels, SAE 940765, February 1, 1994.

Ethanol Should Not Be Mandated in Summertime Gasoline Used in Smoggy Areas

All this leads the ALA to the conclusion that ethanol should not be mandated for use in summertime gasoline - RFG or conventional - in areas with smog problems. To the extent that refiners are allowed to use ethanol in summertime on a widespread basis, we must develop ways of calculating and off-setting the adverse effect from increased evaporation that will occur either from permeation, co-mingling, or both. For instance, California has lowered the RVP of its Phase 3 CalRFG by one tenth of a pound in an effort to offset the co-mingling effect. California is studying the need to provide a greater off-set. If ethanol is mandated through a renewable fuel standard such as is in Senator Daschle's S. 2053, which will triple the amount of ethanol in the national fuel supply, appropriate measures need to be taken to protect areas with smog problems. Congress should eliminate the one pound RVP waiver (Section 211(h)(4)) currently available for conventional gasoline containing 10 percent ethanol sold in the summertime in areas that are non-attainment for ozone. The RVP waiver for 10 percent ethanol fuel also should be eliminated from use in areas designated as non-attainment under the eight-hour National Ambient Air Quality Standard for ozone promulgated in July, 1997. The waiver could be retained for ethanol-containing gasoline sold in areas that do not have smog problems. This also

happens to be the region of the country where much of the ethanol is currently produced. Given what I have described today, refiners must at a minimum meet the same RVP limits that apply to ethanol-free conventional gasoline so that higher volatility ethanol-containing gasoline does not contribute to increased smog in areas that already have unhealthy levels of smog. This, of course, would not prevent the evaporative effects caused by co-mingling that I described previously. It would encourage refiners to avoid selling ethanol-containing gasoline in areas with smog problems during the designated ozone season because meeting lower volatility limits would increase refining costs. Of course, during the rest of the year refiners would be free to sell ethanol-containing gasoline in these areas, as no RVP limits apply.

Congress should also modernize the anti-dumping provisions for conventional gasoline in Section 211 (k)(8) to prevent increases in aromatics and other air pollution increasing constituents as they modify RFG. The ALA suggests substituting 1999 for the current 1990 baseline as a simple means of up-dating this provision to protect conventional gasoline.

Ethanol Increases NOX and Particulates

Most test data show that ethanol in RFG increases NOX tailpipe emissions. In California, the Air Resources Board asserts that these NOX increases are converted in the atmosphere to particulate pollution, thus making it more difficult to achieve the PM-10 National Ambient Air Quality Standard. The ethanol industry asserts that ethanol in RFG actually reduces particulate emissions based on a test conducted by the Colorado Department of Health and Environment. Since this test involved higher RVP winter time fuel and wintertime temperatures, the ALA sees it as supporting the use of ethanol in wintertime oxyfuel, but not useful in judging the benefits of ethanol in RFG. We believe that the NOX increases from ethanol in RFG add to the body of evidence indicating mandatory ethanol use in RFG may increase rather than decrease air pollution levels from fuel.

7 Letter from Michael P. Kenney, Executive Officer, California Air Resources Board to Robert Perciasepe, Assistant Administrator of U.S. Environmental Protection Agency, February 7, 2000.

Ethanol Use in Gasoline and RFG Will Grow

Much discussion has been generated about mandating the use of ethanol in gasoline for air quality reasons, which the ALA opposes. However, we do believe there will be a large role for ethanol in gasoline without any mandate for one simple reason: octane. Assuming that MTBE is either phased down or eliminated from gasoline, which the ALA supports, refiners face a dramatic shortage in clean octane even if every MTBE plant in the nation is converted to produce iso-octane or alkylates, the most logical substitutes for MTBE. This is because MTBE plants converted to produce iso-octane or alkylates lose about 30% volume and produce a product that contains 15 percent less octane per gallon. This octane shortage is magnified by EPA's Tier 2 low-sulfur gasoline standard which will be in full effect in 2006. Refiners will lose modest amounts of Octane in conventional gasoline, as they treat it to reduce sulfur in order to meet the new 30 ppm sulfur average requirement. As a result of these two impacts, a rough calculation indicates demand for ethanol needed to supply octane in gasoline should increase to 3.4 to 3.8 billion gallons per year by 2006, depending upon whether MTBE is totally eliminated from gasoline. (See Tab 4 and Tab 5) This is at least twice the baseline volume of ethanol projected by the Department of Agriculture to be produced in 2006. 8 Should Congress fail to lift the oxygen mandate for RFG so that all the octane currently provided by MTBE be replaced by ethanol in order to simultaneously meet the oxygen requirement, the demand for ethanol would reach 4.6 billion gallons per year in 2006. This would appear to exceed the ability of the ethanol industry to supply ethanol, based on a study conducted for the Governors's Ethanol Coalition. 9 (See Tab 6) Such an outcome would undoubtedly lead to shortages, price spikes, and disruptions which could only lead to reductions in the air quality benefits provided by the RFG program.

\8\ U.S. Department of Agriculture, Economic Analysis of Replacing MTBE with Ethanol in the United States, March, 2000.

\9\ John Urbanchuk, Ability of the U.S. Ethanol Industry to Replace MTBE, March 20, 2000.

Clearly, we will need large increases of ethanol in gasoline, as we phase out MTBE. From an air quality perspective, it is best to set air quality performance requirements for gasoline and allow refiners to use ethanol when and where they need to while meeting performance requirements, taking into account evaporation effects from permeation and co-mingling. Should Congress decide to mandate ethanol in gasoline, we urge that additional air quality protections be put in place that would encourage ethanol use in ways that benefit air quality and not add to the air pollution burden.