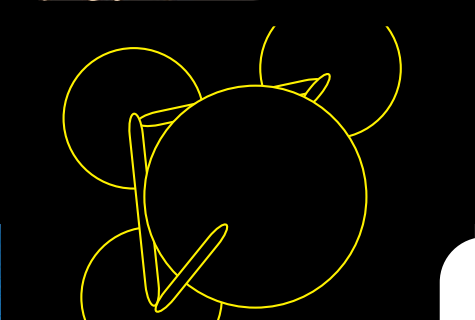


ETHANOL

F A C T B O O K

A COMPILATION OF INFORMATION ABOUT FUEL ETHANOL



PUBLISHED BY
CFDC CLEAN
FUELS
DEVELOPMENT
COALITION

IN COOPERATION WITH
The Governors' Ethanol Coalition
and




Thank You

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*For more information on these companies and organizations,
please see Appendix A.*

Distribution of the "Ethanol Fact Book" made possible through the **Ethanol Across America** education campaign.



For the past century, the United States has supported public policy initiatives to increase the use of renewable fuel ethanol in motor vehicles. The modern fuel ethanol industry was created with the passage of the Energy Security Act of 1978. The Act created favorable tax legislation and research and development commitments which represented the first of numerous bipartisan legislative efforts to expand fuel ethanol production in the United States. As a result of ethanol's bipartisan support, several goals and technological advancements have been achieved by the U.S. fuel ethanol program during the past two decades.

- Ethanol capacity increased from essentially zero to nearly 3 billion gallons per year, and plant efficiency increased steadily at a rate of about 2% per year;
- Refueling infrastructure investments, public acceptance and automaker endorsements have led to the routine use of ethanol in gasoline blends, cleaner burning reformulated gasoline, and alternative fuel vehicles. Today, one out of every eight gallons of gasoline sold in the U.S. contains ethanol, and ethanol vehicles are now routinely produced and sold to the public at no extra cost. More than 3 million flexible-fuel vehicles are currently on the road;
- High protein by-products made in the fuel ethanol production process, such as distillers dried grains and gluten feeds, have gained the full acceptance of feedlot operators and dairymen as premium feeds for their cattle, and represent billions of dollars in valued-added exports;
- Ethanol's ability to reduce toxic air pollution and greenhouse gas emissions is recognized;
- The US ethanol program has resulted in a new industry representing billions of dollars in domestic investment and producing more than 240,000 jobs that increase federal and state tax revenues while strengthening rural communities across the nation;
- A Renewable Fuels Standard, with guaranteed annual increases in ethanol production, will ensure that these benefits will double over the next decade.

These achievements, in concert with major advances in technology to convert cellulosic biomass into fuel ethanol and other biofuels, have set the stage for a significant expansion of the industry during the next decade. Advances in genetics, farming practices and feed grain production will increase the efficiency of ethanol production from conventional and new energy crops. More importantly, the use of cellulosic biomass (i.e., agricultural residues, wood wastes, yard and garden trimmings and the biomass fraction of municipal waste) essentially eliminates the upper boundaries to the production of ethanol and other biofuels.

The use of ethanol can also help offset U.S. dependence on imported oil. Under no circumstance should dependence on imported oil at the level we are now experiencing in this country be acceptable. Exacerbating the situation is the fact that the global demand for petroleum in developing countries like India, China, and Korea is estimated to double the demand — and along with it perhaps the price — over the next two decades.

Our objective is to illustrate the total social costs of transportation fuels to the nation, and quantify the benefits of clean fuel alternatives like renewable ethanol. Based on our exhaustive research, it is clear that America's ethanol policy is not only on the right track, but it has been an essential component of our evolving national energy policy for nearly 20 years. To do anything but strengthen our nation's fuel ethanol policy is a mistake America cannot afford. We hope you enjoy the historical perspective this fact book presents. Our archives of quotes illustrate the consistency of the support for ethanol from every Administration of the past 25 years, and from members of Congress from both sides of the aisle. This history underscores the fact that this is a program of national importance, and dire predictions of trade imbalances, reliance on foreign oil, and the need to diversify our energy base have in large part come true.

We would like to acknowledge the Clean Fuels Development Coalition member companies for their support in the production and distribution of the Fact Book. A special thanks to the many other organizations that supported this effort.

Sincerely,



Douglas Durante, Executive Director
Clean Fuels Development Coalition

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Reducing the federal deficit and oil imports are national public policy priorities

~~“Ethanol production increases farm income, decreases deficiency payments, creates jobs in rural America, and reduces America’s reliance on foreign oil.”~~ ¹

~~— President Bill Clinton, October, 1996~~ ²

~~“President Clinton and I will strongly and actively oppose any effort to eliminate the ethanol program. We challenge Congress to do what is right for our farmers, our rural communities, our environment and our national security.”~~ ³

~~— Vice President Al Gore, April 20, 1998~~ ⁴

~~“I am committed to searching for innovative uses for agricultural products with environmentally beneficial uses such as ethanol. Ethanol is one product that helps America’s farmers and aids in making our air cleaner.”~~ ⁵

~~— President George W. Bush, November 2000~~

In 1973 the United States suffered a domestic economic crisis directly caused by international forces. With the Arab Oil Embargo of 1973, Americans witnessed the effects of our dependence on imported oil: long lines at gas stations; lost productivity; declines in the stock market; economic recession; and general economic unease.

The first Congressional response to the petroleum crisis was the *Energy Tax Act of 1978*,¹ which granted gasoline blended with at least 10% ethanol an exemption from the four cent per gallon federal fuel excise tax on gasoline.² The goal of this initiative was to stimulate production of the only viable, domestically-produced, renewable fuel source capable of immediately reducing America’s dependence on imported oil—ethanol.

In 1980, following the oil crisis of 1979, the Iranian Hostage Crisis, and the U.S. grain embargo of the



Facts For The Record:

The Energy Tax Act, Energy Security Act, Alternative Motor Fuels Act, Clean Air Act, and the Energy Policy Act ¹ all identify ethanol as a way to achieve a variety of important public policy goals. ~~Ethanol was the centerpiece of Energy legislation passed by the Senate in 2002 and again in 2003.~~ ²

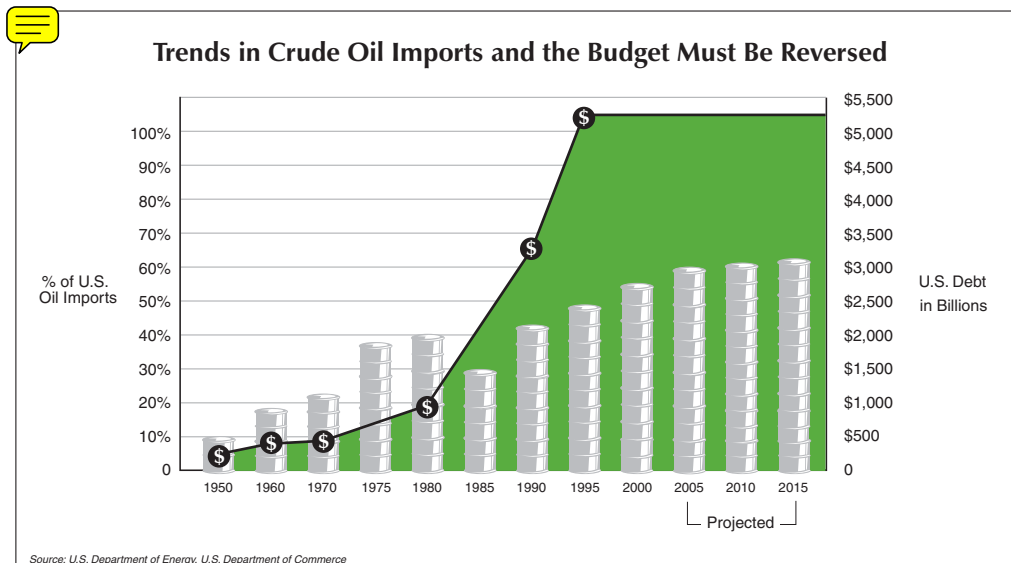


Soviet Union, Congress continued efforts to spur domestic fuel production and reduce American reliance on imported crude. Two additional measures — the *Crude Oil Windfall Profit Tax Act of 1980*⁴ and the *Energy Security Act of 1980*⁵ continued to promote energy conservation and development of domestic fuels. The 1980 *Crude Oil Windfall Profit Tax Act* extended the expiration date for the ethanol tax exemption from 1984 to 1992,⁶ and allowed ethanol to be used as an alternative fuel or in prescribed blends with gasoline by giving ethanol producers various alternatives to utilize this exemption.⁷

Throughout the 1980s, Congress supported fuel ethanol. In 1982, the *Surface Transportation Assistance Act*⁸ raised the gasoline excise tax from four cents per gallon to nine cents per gallon and increased the tax exemption for 10% ethanol blended gasoline to five cents per gallon.

“Our overall gasohol program will spur the investments that we, together, must make for a more secure energy future. We will create new markets for our farmers. We will no longer have to throw away waste materials which can be turned into profitable essential fuels.” — President Jimmy Carter, January 11, 1980³

~~*“I believe the time is right for the expanded use of biofuels. America is dangerously dependent on foreign oil. I am committed to passing an energy bill that helps America become more self-reliant, more prosperous, and more secure. I assure you that the expanded production of biofuels will play a role in that bill.”*~~ — U.S. Senator Pete Domeneci, Chairman, Senate Energy Committee, February 17, 2003⁹



Ethanol policy represents two decades of bipartisan legislative support

"I am informed that many new distilleries are being planned to make alcohol from corn, potatoes, beet sugar waste, etc. Development along these lines should be encouraged until every section of the country has its own industrial distillery." — C.M. Freeman, Secretary, National Grange, 1906

"We can get fuel from fruit, from the sumac by the roadside, or from apples, weeds, sawdust; almost anything. There is enough alcohol in one year's yield of an acre of potatoes to cultivate that field for a hundred years. And it remains for someone to find how this fuel can be produced commercially — better fuel at a better price than we now know." — Henry Ford, 1908

~~*"Fuel ethanol reduces crude oil imports and is environmentally friendly, it also helps meet other national public policy goals." — Congressional Research Service, 1993⁹*~~

In 1984, the *Tax Reform Act*¹⁰ raised the ethanol tax exemption from five to six cents per gallon. In 1990, through the *Omnibus Budget Reconciliation Act*,¹¹ Congress extended the ethanol tax incentive from 1992 to 2000 and decreased the amount of the incentive from six to 5.4 cents per gallon.

*The Alternative Motor Fuels Act of 1988*¹² created programs for research, development and demonstration projects on both vehicles and fuels, plus fuel economy credits for automakers. According to the Congressional Research Service, this law was "designed. . .to foster the development, introduction and diffusion of alternative nonpetroleum fuels into the transportation sector and thereby reduce oil imports while at the same time create domestic jobs, improve urban air quality, and stay even with if not reduce, emissions of greenhouse gases."¹³ As a direct result of appropriations from this Act, the National Ethanol Vehicle Coalition estimates that almost 20,000 vehicles capable of using 85 percent ethanol blended gasoline were manufactured. Today, nearly 3 million of these vehicles are on the road.

With the passage of the *Clean Air Act Amendments of 1990*, Congress, for the first time, explicitly recognized that changes in motor fuels and fuel composition play a vital role in reducing pollution from motor vehicle exhaust. The Act created two new gasoline standards specifically designed to reduce harmful fuel emissions in all vehicles located in highly polluted U.S. cities. Among other beneficial fuel composition changes, the Act required gasoline to contain cleaner-burning





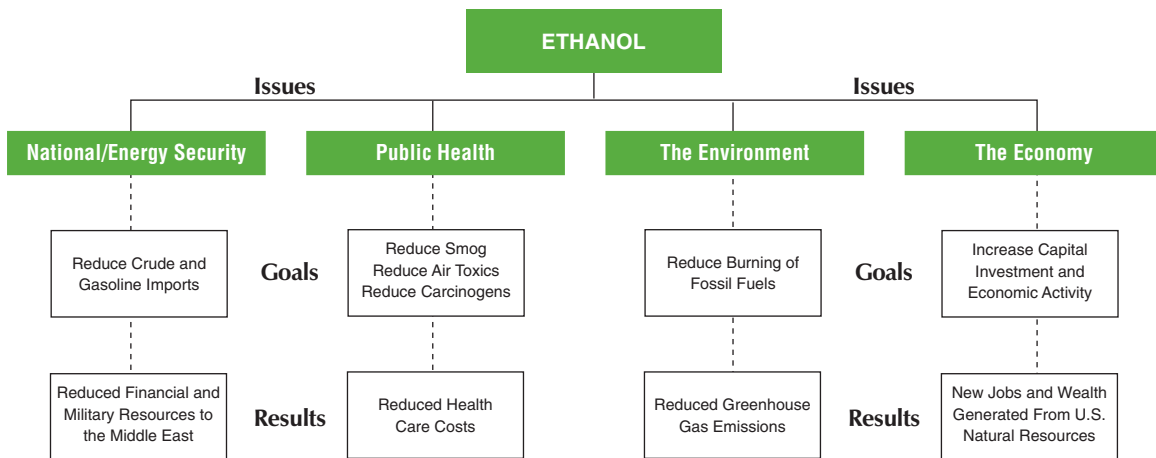
additives called fuel oxygenates. Fuel oxygenates include ethanol, an ethanol derivative known as ethyl tertiary butyl ether (ETBE), and methyl tertiary butyl ether (MTBE), a methanol derivative. These fuel oxygenates are required in all gasoline sold in areas of the country with high carbon monoxide pollution during the winter months, and year-round in areas of the country with high ozone pollution.

Congress passed the *Energy Policy Act of 1992*, to set a national goal of 30% penetration of alternative fuels, including ethanol, in the light-duty vehicle market by 2010 and require, in sequence, the Federal Government, alternative fuel providers, state and local governments, and private fleets to buy alternative fuel vehicles.

On June 9, 1998 President Bill Clinton signed the Transportation Efficiency Act of the 21st Century (TEA 21) which extended the ethanol tax incentive through 2007. "I am pleased that the Act extends the ethanol tax incentives through 2007. These are common-sense investments that will help protect air quality, reduce greenhouse gas emissions, and create new economic opportunity for farmers," said President Clinton.

There is no better example of the bi-partisan support for ethanol than the historic votes of the U.S. Senate in 2002 and again in 2003 to establish a Renewable Fuels Standard for motor fuels. Seventy percent of the U.S. Senate supported this provision, bringing members from both parties together on this crucial issue.

Fuel Ethanol Is Helping Meet National Public Policy Priorities



The fuel ethanol program is a success

As a result of the past 25 years of Congressional initiatives, over two trillion miles have been driven on ethanol-blended fuel.¹⁴ Ethanol is now used for alternative fuel vehicles, aviation fuels and as an additive to meet clean gasoline standards.


Since 1978:

- The U.S. ethanol industry has built the capacity to produce more than ~~3~~ billion gallons per year of high octane, clean-burning ethanol;

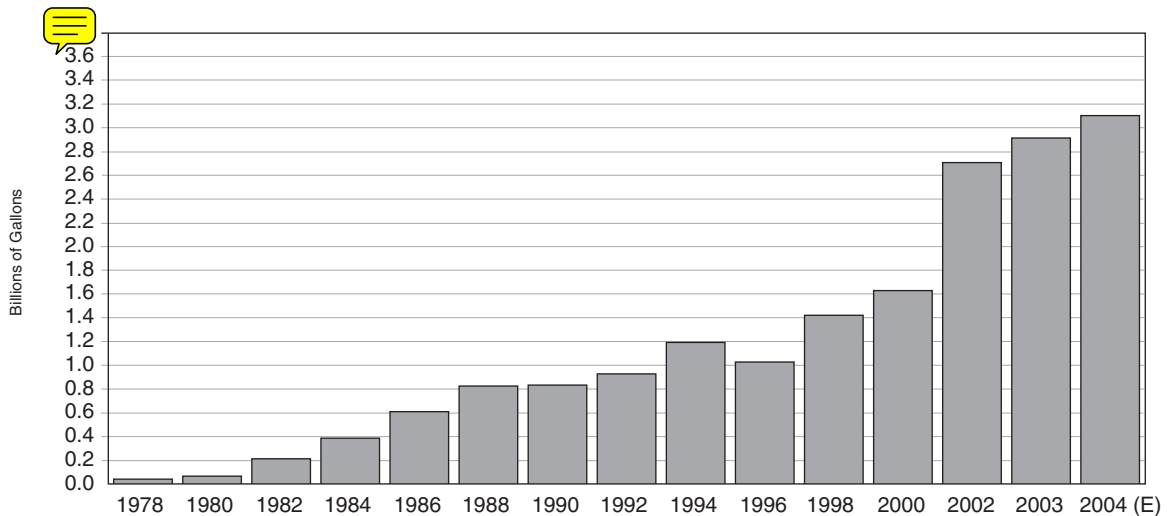
- There has been over \$5 billion in capital investment in fuel ethanol production facilities;¹⁵

- ~~Seventy-five~~ fuel ethanol plants located in ~~20~~ states have been developed, with production capacities ranging from ~~500,000~~ gallons to 310 million gallons per year;

- Fuel ethanol plants are owned by large agri-processors and farmer cooperatives; and

-  GM and DaimlerChrysler are building hundreds of thousands of vehicles to run on conventional gasoline or up to 85% ethanol. These vehicles are available to consumers today at no additional cost.

U.S. Fuel Ethanol Production 1979-2004



(E) Ethanol production estimated based on year-to-date production from U.S. EIA




● **Facts For The Record:**

Ethanol is the only proven commercial scale renewable transportation fuel currently available in the marketplace,¹⁷ and has the potential to replace at least 10% of the nation's gasoline supply.¹⁸

“The cost to the U.S. economy over the past 25 years of over reliance on OPEC oil, including the cost of price shocks, is estimated at \$4 trillion, and a price shock in 2005 would cost the U.S. economy half a trillion dollars.” — Oak Ridge National Laboratory, October 2, 1996¹⁶

“The lure and the illusion of low gasoline prices has lulled us into placing our economic security in jeopardy, our military forces at risk and our leadership in question.” — General Lee Butler (USAF ret.), Chairman, Clean Fuels Foundation

 *We are increasingly concerned about America's mounting dependence on imported oil and petroleum products. As you know, imports now exceed 50% of use and are expected to reach 61% by 2015 with dependence on OPEC and the Persian Gulf also on the rise. These imports account for about 35% of the nation's trade deficit. These dependencies carry heavy costs.” — General Lee Butler (USAF Ret.), Former Commander, Strategic Air Command, Robert C. McFarlane, Former National Security Advisor to the President of the United States, R. James Woolsey, Former Director of Central Intelligence, Admiral Thomas H. Moorer (USN Ret.) Former Chairman, Joint Chiefs of Staff, June 11, 1997 in letter to U.S. House of Representatives and Senate*

U.S. reliance on imported oil carries a high price

In response to the nation's first energy crisis . . . "It is a crisis of confidence. It is a crisis that strikes at the very heart, soul and spirit of our national will. [This is] the moral equivalent to war." — President Jimmy Carter, July 1979

"And I don't know if you saw what Saddam Hussein said the other day. He said the biggest mistake he made is when he first moved into Kuwait, that he didn't move into Saudi Arabia... So what we've got to do, it seems to me, is to try to become less dependent on foreign oil for security reasons, and that means alternate sources." — President George Bush, June 18, 1992

*"It has been the policy of every American president since Harry Truman, that as long as our energy resources are dependent on that part of the world (i.e., Middle East), we are going to be there in force."*¹⁹
— Senator John McCain (R-AZ)

*"Our paramount national security interest in the Middle East is maintaining the unhindered flow of oil from the Persian Gulf to world markets at stable prices."*²⁰
— U.S. Department of Defense, May 1995

MAINTAINING A MILITARY PRESENCE IN THE PERSIAN GULF

Since 1949, U.S. interests and objectives in the region have included maintaining the uninterrupted flow of Persian Gulf oil, ensuring the security of Israel, and promoting a comprehensive resolution of the Arab-Israeli conflict.²¹

The 1990 Persian Gulf War provided the United States with first hand experience of the cost of protecting oil supplies associated with an escalated military conflict in the Middle East. "The original intent of Saddam Hussein," said Senator John Glenn (R-OH) in 1990, "was to take over 70% of the world's known oil reserves. That would give him control over much of the energy for the whole industrialized world."²²

Today, the Persian Gulf region holds nearly two-thirds of all the world's known oil reserves and the U.S. now imports more than 55% of its petroleum. "In 1990," said Rep. Jim Nussle (R-IA), Congress voted that "50% dependence on foreign oil should be considered a peril point for U.S. security." The U.S. Department of Energy estimates the U.S. will import as much as 68% of its oil demand by the year 2010.²³

The energy security cost to the U.S. of maintaining the uninterrupted flow of oil from this area is approximately \$50 billion per year, and depending on various assumptions in several studies, can make the true cost of oil, counting military and energy security expenses, as high as \$100 - \$150 per barrel.^{24, 25}



A study by the National Defense Council Foundation (NDCF) in 2003 provides the most in-depth examination of this subject since the 1987 study by the General Accounting office, which was prior to the first Gulf War. The NDCF study found that America spends \$49.1 billion defending Persian Gulf oil, adding more than one dollar to the cost of a gallon of gasoline.

The study further concluded that the overall economic toll of this dependence on foreign oil is staggering. The diversion of capital and investment resulting from spending nearly \$100 billion annually on foreign oil, i.e. money that would otherwise be spent in the U.S., costs the U.S. economy more than 800,000 jobs per year, and costs federal, state and local government treasuries \$13.4 billion in lost revenues.

“They say we have foreign oil. Well, how are we going to get it in case of war? It is in Venezuela... It is out in the East, in Persia and it is in Russia. Do you think that is much defense for your children?” — Francis Garvan, President, Chemical Foundation, 1936

● **Facts For The Record:**

Taken together, the economic losses, the defense costs, and oil supply disruption costs bring the total cost of imported oil to approximately \$250 billion per year, or close to \$4.00 per gallon over the current purchase price of gasoline. — *National Defense Council Foundation*

For the 10 year period before the Gulf War, the cost of U.S. military and foreign aid programs in southwest Asia [Persian Gulf] from 1980 to 1990 is estimated at \$365 billion, or \$36 billion per year. *General Accounting Office*²⁷ The NDCF study estimates the annual cost has now risen to nearly \$50 billion per year.

A recent New York Times editorial put the real cost of gasoline — including military expenditures — at \$5 a gallon.²⁸



Environmental costs are not included in the market price of crude oil

“Oil and motor vehicle use are responsible for enormous hidden economic and health costs due to environmental damage. Economists term these costs “externalities” because they are not included in the private costs of transportation.” — Office of Technology Assessment, 1994

“Over the last decade, the death rate for lung disease has risen faster than that of any of the top leading causes of death. Tens of millions of Americans live in areas not meeting at least one federal air quality standard. The health costs of air pollution are estimated to be \$50 billion each year.”
— American Lung Association

“Human mortality and morbidity due to air pollution accounts for over three-quarters of the total environmental cost and could be as high as \$182 billion annually.”
—Union of Concerned Scientists²⁹

Recent studies have linked ground level ozone pollution with increases in approximately 10,000 to 15,000 hospital admissions for respiratory conditions in 13 cities during the 1993–1994 high ozone season. Between 30,000 and 50,000 emergency room visits during the same months are linked with high ozone levels. Approximately 90 million Americans live in areas with dangerous levels of ozone pollution.³⁰

The U.S. Department of Energy estimates 82% of the carbon monoxide, 43% of the reactive organic gases (precursors to ozone) and 57% of nitrogen oxides in domestic cities are emitted from petroleum-based transportation fuels.³¹ Gasoline emissions also lead directly to the creation of ground-level ozone (smog) pollution. Congress responded to the gasoline exposure threat to humans and the environment by enacting the *Clean Air Act Amendments of 1990*.

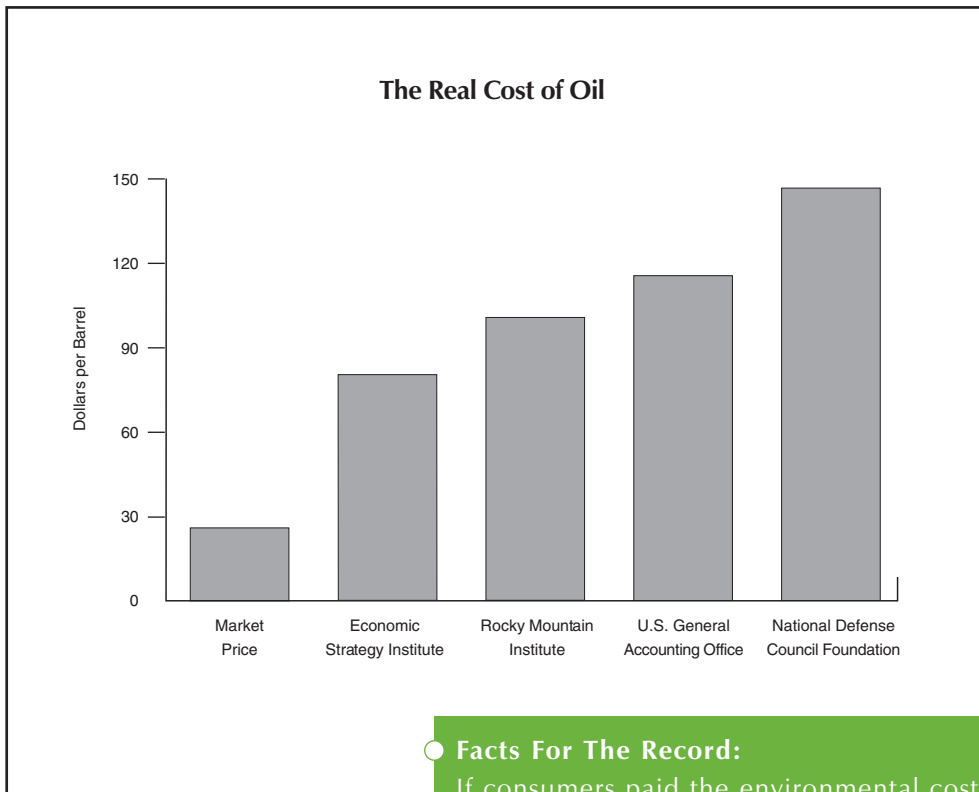
This Act specifically required production and distribution of cleaner-burning gasoline, containing oxygenates such as ethanol, in America’s most polluted cities. Since their introduction in January 1995, these “reformulated” fuels have been a resounding success — lowering air toxic emissions by as much as 28%, VOC emissions by 17%, and NOx emissions by approximately 2 to 3%. As a result, many Congressional leaders are calling for the use of cleaner-burning gasoline nationwide.

The use of ethanol is helping reduce harmful pollutants in our air and therefore is helping reduce health care costs. Even with a likely relaxation of oxygen standards in favor of a Renewable Fuels Standard, ethanol will continue to play a vital role in reformulated gasoline.



“Aromatic hydrocarbons in gasoline include benzene, toluene, and xylene. Benzene is a known carcinogen, one of the worst air toxics. 85% of all benzene in the air we breathe comes from motor vehicle exhaust. Xylene from automobile exhaust in the morning rush hour will form ozone [smog] in sunlight to choke our lungs by the afternoon trip home. Toluene, another aromatic, usually forms benzene during the combustion process and thus becomes carcinogenic along with benzene in the gasoline.” — Senator Tom Harkin (D-IA)³²

The U.S. Commerce Department estimates that each \$1 billion of trade deficit costs the U.S. 19,100 jobs.



● **Facts For The Record:** If consumers paid the environmental costs of crude oil directly, prices would be \$7 - \$27 higher per barrel.³³

Petroleum imports account for a significant portion of America's trade deficit

A trade deficit indicates that the United States imports more goods and services than it exports. Petroleum imports account for approximately 35% of America's current trade deficit. Some projections suggest that petroleum imports will rise to over 60 to 70% of the U.S. trade deficit in the next 10 to 20 years.³⁴ Based on annual increases, that may not be far off. In 1987, the United States trade deficit in crude oil was \$27 billion. In 1990, that figure nearly doubled to \$43.7 billion and by 1999 increased to \$59.2 billion.³⁵ In 2002 the U.S. spent just under \$110 billion on foreign oil, representing a massive transfer of U.S. wealth to foreign countries. One reason for the increases in the trade deficit is the continued growth of the transportation sector. With 97% of our transportation fuel derived from petroleum, and the majority of our petroleum imported, the following factors are shaping future demand:

- Vehicle-miles traveled increased from 1.1 trillion per year in 1970 to over 2.7 trillion per year in 1996;³⁶
- The total number of vehicles registered increased 78% since 1970;
- Fuel consumption from 1970 to 2002 increased from 12 billion to over 167 billion gallons per year;³⁷
- As we move into the next century, demand for petroleum products will continue to increase. Developing countries such as China and India alone are expected to double world demand.
- While total consumption and imports continue to dramatically increase, domestic oil production continues to decline. In 1970, the United States produced more than 10 million barrels per day, but by 1991, that figure dropped to just 7.4 million barrels per day.³⁸ Oil production in the U.S. is projected to continue at or below current levels of 9 million barrels per day.³⁹

As global oil demand increases, so will the price. The huge jump in the overall trade deficit from 1999 to 2000 corresponded with an increase in crude oil from \$17.26 per barrel to \$27.72 per barrel. (*Petroleum Marketing Monthly, US DOE/EIA, Feb. 2001*)

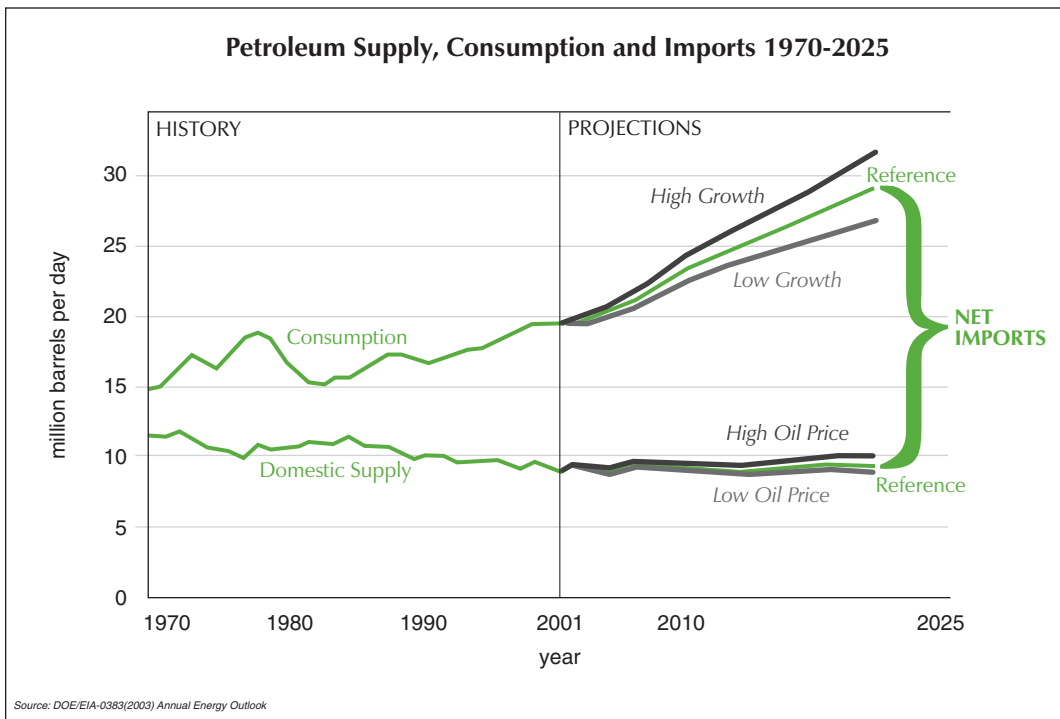


Facts For The Record:

In 1987, the United States trade deficit in crude oil was \$27 billion and nearly doubled to \$43.7 billion by 1990. By 1999 it increased to \$59.2 billion and surpassed \$100 Billion in 2002.⁴⁰

Fuel consumption from 1970 to 2002 increased from 12 billion to over 160 billion gallons per year.⁴¹

“We simply must diversify our sources of energy, and we must do so in a way that lessens our dependence on foreign sources for this energy. The fact that almost 60% of our energy sources are coming from overseas is simply too much, it is unacceptable today. America’s energy policy should be consistent with our foreign policy in that it has the principles of independence and security at its foundation.” — U.S. Senate Majority Leader Bill Frist, July 22, 2003



Increased petroleum consumption, coupled with decreased U.S. production, means net imports will continue to rise. The more economic growth the U.S. enjoys, the more the import figure increases.

Ethanol production helps reduce petroleum imports

“Renewable ethanol and ETBE are among the most abundant and cost-effective renewable fuel options to reduce imported oil.” — Ed Rotheschild, former Energy Policy Director; Citizen Action 1994

“...renewables utilized in gasoline—ethanol—play an important role and will continue growing well into the future.”
— Red Caveney, President and CEO, American Petroleum Institute, Congressional Testimony, March 29, 2001

“The U.S. trade deficit rose to a record \$34.3 billion in September 2000 as imports hit an all-time high and exports decreased slightly. The deficit showed a slight increase in America’s foreign oil bill, which rose 4.2% to \$10.7 billion for the month. The increase reflects a sharp jump in the price of crude oil, which surged to an average of \$28.98 per barrel, the highest level in 10 years ...”— U.S. Department of Commerce, October 2000

“Failure to meet increasing energy demand with increased energy supplies, and vulnerability to disruptions from natural or malevolent causes, could threaten our nation’s economic prosperity, alter the way we live our lives, and threaten our national security”. — Secretary of Energy Spencer Abraham, March 20, 2003



According to the Energy Information Administration, at current capacity, we are producing more than 180,000 barrels of fuel ethanol per day (July 2003), which directly reduces the amount of crude oil we need to import. A study by the U.S. General Accounting Office previously concluded that ethanol and other oxygenates could displace 311,000 barrels per day by 2010.⁴² The total amount of petroleum ethanol could displace under those Clean Air Act programs would be approximately 3.7% of estimated U.S. gasoline consumption in 2010. Increases in ethanol production can offset the annual increases in fuel consumption the U.S. experiences, generally on the order of 2% per year.

The 5 billion gallon per year ethanol production level that would result from a Renewable Fuels Standard could reduce oil imports by nearly 350,000 barrels per day. And, it is very likely that the 5 billion gallon level will be attained long before the statutory deadline of a decade, making it equally likely that a 10% reduction



● **Facts For The Record:**

Replacing a portion of a gallon of gasoline with ethanol helps reduce America's reliance on petroleum . . . and provides additional markets for domestic corn and other grains. — *General Accounting Office*⁴⁸

Since 1978, U.S. ethanol production has replaced over 14 billion gallons of imported gasoline or crude oil.⁴⁹

in oil use resulting from domestic ethanol is within reach over the next 10 to 15 years. At that level, we could be displacing between 700,000 to 900,000 barrels of oil every day.

Fuel ethanol is the only commercial scale renewable transportation fuel produced in abundance in the United States today. Because ethanol increases octane, it also increases gasoline yields (production) at the refinery. For every barrel of ethanol produced, 1.2 barrels of petroleum is displaced at the refinery.⁴⁴

Many people do not realize that, in addition to the soaring amount of crude oil imported by the U.S., we also import significant amounts of refined products. In fact, we import 37 million gallons of gasoline per day,⁴⁵ an amount that has more than doubled in just the past three years.

Current U.S. ethanol production of nearly 3 billion gallons per year can reduce those gasoline imports by 35% and effectively extends gasoline supplies at a time when refining capacity is at its maximum.⁴⁶
“No single policy tool can substantially increase

*“Because fuel ethanol reduces crude oil imports and is environmentally friendly, it also helps meet other national public policy goals. Since 1988 Congress has enacted three major pieces of legislation designed, among other objectives, to foster the development, introduction and diffusion of alternative nonpetroleum fuels into the transportation sector and thereby reducing oil imports while at the same time creating domestic jobs, improving urban air quality and staying even with if not reducing, emissions of greenhouse gases.” — Congressional Research Service*⁴³

America's energy security. The basic vulnerability involves oil, but reducing this vulnerability requires a broad array of actions: maintaining adequate strategic reserves; increasing the efficiency of our entire fleet of cars, trucks, trains, planes, and buses; increasing U.S. petroleum production in an environmentally sensitive manner, ...and using alternative fuels.”
— U.S. Department of Energy⁴⁷

The significance of refinery capacity cannot be understated. Over the last several years the petroleum industry has repeatedly stated in Congressional testimony that one of the primary causes of price spikes was disruptions to refinery operations, or in times of peak driving and demand, the inability of refineries to produce enough gasoline.

Ethanol production creates jobs and stimulates the economy

United States ethanol production in 1993 alone led to the creation of almost 200,000 jobs per year according to a study by Northwestern University's Kellogg School of Management. According to the Kellogg study:⁵⁰

- During ethanol plant construction, approximately 370 local jobs are created, providing up to 5,604 person-years of work;
- During ethanol plant operation, up to 4,000 local jobs are created;
- Ethanol plant construction creates \$60 million to \$130 million in additional income;
- Ethanol plant operation creates \$47 million to \$100 million in additional income.

Since that time ethanol production has increased by 20%, creating even more jobs. Numerous independent studies have confirmed that ethanol production creates domestic jobs, including a report by the Economic Research Service of the United States Department of Agriculture which estimated that increasing production capacity to five billion gallons per year would create an additional 108,000 jobs nationwide — in the ethanol industry alone. This would have a profound impact on rural America where a decline in employment has already placed increasing burdens on our cities, infrastructure and tax base.



A more recent study conducted by AUS Consultants and SJH & Co. in 2002⁵¹ identified even more positive impacts from a base case of a 40 million gallon per year ethanol plant, including:

- With an approximate cost of \$60 million and one year of construction, the facility will expand the economic base for the local economy by \$110 million;
- Ethanol production will generate an additional \$19.6 million in household income;
- Tax revenue for the state and local governments will increase by a minimum of \$1.2 million;
- Nearly 700 permanent jobs will be created.



● **Facts For The Record:**

Doubling the U.S. ethanol industry as called for in the Renewable Fuels Standard will create nearly 50,000 permanent jobs, with indirect employment in the hundreds of thousands.

The expansion of current ethanol capacity to meet the demand created by replacement of MTBE in the nation's reformulated gasoline is projected to cost nearly \$1.9 billion. USDA projected that the increased demand for corn to support the additional ethanol production will increase cash receipts from marketings for farmers by \$2.3 billion between 2000 and 2004.

— AUS Consultants, March 20, 2000⁵²



"Our [ethanol] program will create new markets for our farmers. We will no longer have to throw away waste materials which can be turned into profitable essential fuels." — President Jimmy Carter, January 11, 1980

"The American Petroleum Institute estimated that the presence of ethanol causes gasoline prices to be 0.27% lower than would occur without ethanol. The total cost saving to the consumer. . . is approximately \$270 million per year." — U.S. Department of Energy

"When we took office in 1981 only 75 million gallons of ethanol were being produced. This year more than 450 million gallons will be produced, requiring more than 180 million bushels of corn. It just goes to show there's no limit to what free people can do when the gloom-and-doomers stand aside and get out of the way." — President Ronald Reagan, August 20, 1984

Ethanol saves the treasury billions of dollars each year

Fuel ethanol production generates wealth and jobs by processing domestic, renewable resources into clean burning transportation fuel.

- The General Accounting Office reports that a 50% decline in the production of fuel ethanol would actually cost the U.S. Treasury \$3.2 billion annually.

- In 1997, the top 10 corn growing states reported a combined \$464.8 million boost in tax receipts as a direct result of corporate income and sales tax on ethanol producers." — U.S. Department of Agriculture, May 1997

- In Nebraska, ethanol production alone accounted for 3% of total tax receipts.⁵³

- Through four different studies completed in the past four years, it is estimated that construction of a 50 to 100 million gallon wet-milling ethanol production facility would create between \$60 million and \$100 million in additional income. And, an additional \$47 million to \$100 million in income would result from the operation of such a facility.⁵⁴

- According to an economic analysis by AUS Consultants, the "combination of reduced farm program costs and increased income tax revenues results in a net gain (inclusive of ethanol tax incentives) to the U.S. Treasury of \$1.30 per gallon of ethanol produced."⁵⁵ As a result, ethanol generates \$555 million of net tax revenue for the Federal Treasury annually through personal and business tax receipts.⁵⁶

● Facts For The Record:

According to AUS Consultants, a four-fold increase in ethanol production over 15 years would result in U.S. taxpayers saving \$57 billion and would add \$685 billion to real GDP.⁵⁷

A dramatic 90% decline in ethanol production would cost the U.S. taxpayers \$6.3 billion annually.
— *General Accounting Office*⁵⁸



“A study by Northwestern University concluded that ethanol is responsible for more than 195,000 domestic jobs and increases farm income by \$4.5 billion a year. The ethanol industry adds over \$450 million to state tax receipts and improves the U.S. trade balance by \$2 billion annually. This is all done at net savings of \$3.6 billion a year to the federal government.” — Gov. Terry Branstad (R-IA), August 8, 1997

“The Renewable Fuels Standard would....create more than 200,000 jobs nationwide and boost U.S. farm income by \$6 billion per year” — U.S. Senator Chuck Hagel, Feb. 14, 2003

LOSING U.S. ETHANOL PRODUCTION WOULD COST THE GOVERNMENT AND TAXPAYERS BILLIONS OF DOLLARS

For comparison, the General Accounting Office reports that a 50% decline in the production of fuel ethanol would actually cost the U.S. Treasury \$3.2 billion annually,⁵⁹ and a dramatic 90% decline would cost the U.S. taxpayer \$6.3 billion annually.⁶⁰ Further, the U.S. Department of Agriculture estimates that elimination of the ethanol tax incentives would reduce net farm income by \$5.9 billion to \$10.2 billion between 1998 and 2005.⁶¹

Fuel ethanol provides tremendous trade benefits

Ethanol production creates a number of valuable co-products. Among these are distillers dried grains, corn gluten (used as animal feed supplements), corn oil and carbon dioxide.

- Figures from the Corn Refiners Association placed exports of corn gluten at \$604 million in 2001, more than \$200 million of which is attributable to ethanol production. An estimated 441,000 metric tons of corn oil, valued at \$214 million, were exported in 2001.⁶² In addition to these co-products, about 125 million gallons of fuel ethanol were exported, and 10 million gallons were used to make ethyl tertiary butyl ether (ETBE) for export.⁶³

- A report by Dr. Michael K. Evans, Professor of Economics at Northwestern University's Kellogg School of Management, estimates ethanol production improved the U.S. trade balance by approximately \$2 billion in 1997 alone.⁶⁴

- A 1997 report by the U.S. Department of Agriculture indicated that eliminating the ethanol tax exemption would increase the trade deficit by \$4.5 to \$7.8 billion between 1998 and 2005.⁶⁵ Using Department of Commerce estimates, that means the United States could lose 95,500 to 152,800 jobs.⁶⁶

- Aside from the value of any co-products, ethanol, used as an alternative fuel or as a blend with gasoline, also helps to improve the trade balance by displacing imported petroleum, which is a key culprit in our trade deficit. In the first half of 2003 ethanol production was at a monthly level of more than 180,000 barrels per day. This results in a gallon for gallon reduction in the amount of petroleum used, and using less petroleum means importing less petroleum.⁶⁷ At the average price of oil per barrel paid by US refiners in 2000 (\$27/bbl, Source: EIA), ethanol would reduce the trade deficit by more than \$1.7 billion per year.





● **Facts For The Record:**

Ethanol production will improve the U.S. trade balance by approximately \$2 billion in 1997 alone. – Kellogg School of Management⁶⁹

Eliminating the ethanol tax exemption would increase the trade deficit by \$4.5 to \$7.8 billion between 1998 and 2005. – U.S. Department of Agriculture⁷⁰

“In the last 10 years, the total of U.S. trade deficits has exceeded \$1 trillion. This persistent pattern has contributed significantly to declining real wages and to increasing job insecurity. Most of its victims are middle-income working people. It is estimated that the manufactured goods trade deficit represents a loss of some three million American jobs.” — AFL-CIO Executive Council⁶⁸

“The U.S. goods trade deficit increased 5% in 1995, considerably slower than the 25% jump between 1993 and 1994. Since 1992, the goods trade gap has widened nearly 82%.” — 1995 Annual Report, U.S. Trade Representative

“In the 1980s, the U.S. merchandise trade balance ballooned from a deficit of \$19 billion in 1980 to \$53 billion in 1983, and then doubled in a year, to \$106 billion in 1984. Last year it stood at \$188 billion, setting a new high record for the third consecutive year.” — Senator Robert Byrd (D-WV), March 19, 1997

“The trade deficit for the month of May 2003—one month—was \$41 billion—a total for the entire year in 1984”. — US Department of Commerce , Bureau of Economic Analysis release 8/14/03

Fuel Ethanol Tax Incentive

“I will vigorously oppose efforts in the Senate to increase anybody’s taxes, including taxes on ethanol. And in any case, we should not raise taxes on renewable fuels since such taxes are not in the interest of the economy, the environment or Texas and American corn growers.”— Senator Phil Gramm (R-TX), September, 1995

“In the last two decades, ethanol has grown from a fledgling industry to make a real contribution to our environment, our national economy, and our efforts to wean ourselves from foreign sources of energy... To continue the progress made so far, and to provide Americans with a choice of oxygenated fuels, it is critical that we extend these tax incentives beyond 2000. Only by extending these incentives until 2007 will farmers and renewable fuels producers have the certainty they need to invest in new ethanol plants and thus to further expand our domestic renewable fuels industry.”— President Bill Clinton, July 31, 1997

“The incentive is claimed by thousands of gasoline marketers — mostly independent, small businesses — that sell ethanol blends all across the country. In other words, the incentive is claimed at corner gas stations not in corporate boardrooms.”— Senator Richard Durbin (D-IL), May 1997

Present law provides a partial exemption from the federal excise tax on gasoline for gasoline blended in prescribed portions with ethanol. The excise tax exemption is 5.2 cents per gallon of gasoline blended with 10% ethanol. Gasoline blenders can also use lower amounts of ethanol to meet clean gasoline standards and claim an exemption of 4 cents for gasoline containing 7.7% ethanol, and 2.96 cents for gasoline containing 5.7% ethanol. The ethanol tax exemption provides the price difference between the higher market price of ethanol when compared to the wholesale price of gasoline. The exemption was reduced from 5.3 cents in 2001 to 5.2 cents in 2003, and will drop to 5.1 cents in 2005. Although expected to be extended, the exemption currently is scheduled to expire December 31, 2006. Gasoline blenders have the option to use the exemption or an income tax credit, which is also equal to 52 cents per gallon of ethanol.

Federal government incentives to help develop certain products and/or industries are not new. By the end of World War II the federal government invested over \$12.7 billion in direct funding to build 1,600 various industrial plants and another \$6 billion in indirect subsidies to build hundreds more — this would be the equivalent of \$95 billion today.⁷¹ This investment launched the United States as the world’s strongest industrial power.

The petroleum industry is one of the industries that has been substantially supported by the U.S. government. While some in the U.S. oil industry remain among the most adamant critics of ethanol’s tax incentive, U.S. based international oil companies have actually received substantial public support. In fact, far more government dollars have gone to the petroleum industry than the ethanol industry. A recent study by the U.S. General Accounting Office found that since 1968, the oil industry has received approximately \$150 billion in tax incentives. By contrast, the ethanol industry has received \$11.2 billion through a partial exemption of the federal excise tax and \$200 million in income tax credits.⁷²



Facts For The Record:

“Under current circumstances, we cannot avoid being there [the Middle East]. We have to be there. But over the long run, it is the purest of folly to assume that problems, such as the proliferation of weapons of mass destruction and terrorism in that part of the world, in part funded by oil money are going to somehow magically go away.” – Jim Woolsey, former Director, Central Intelligence, Chairman of the Advisory Committee, Clean Fuels Foundation, April 3, 1998 *Fuel Ethanol in the 21st Century Seminar*

“U.S. taxpayers are providing at least \$5 billion a year in tax breaks in the form of foreign tax credits to provide U.S. multinational oil companies with an incentive to invest billions of dollars to find and produce oil overseas so that it can then be exported to the United States.” – *Citizen Action*⁷⁴

“What’s wrong with using the tax breaks to spur domestic energy production? We’ve certainly done it in the past, and, with our precarious dependence on foreign oil, we will have to do much more of it in the future. Money invested in producing domestic fuels whether ethanol, methanol, shale oil, or coal liquids and gases, is money spent in this country and not money lost to OPEC. It stimulates the economy, creates jobs, and most importantly, helps free us from our addiction to imported oil.”
— U.S. Senator Birch Bayh (D-IN), December 3, 1980⁷³

“I support the ethanol tax benefit. I support the current ethanol program and would support its extension beyond the 2007 expiration date.” — President George W. Bush, November 2000

**Tax Incentives for Petroleum and Ethanol Fuels:
Estimates of Revenue Losses Over Time**
Dollars in Millions

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

Source: U.S. General Accounting Office

Ethanol helps remove harmful pollutants from the air we breathe

The Environmental Protection Agency (EPA) estimated total annual cancer cases from gasoline and its combustion products in 1995 was between 250 and 600,⁷⁵ and ranked gasoline as the number one source of toxic emissions.⁷⁶

A 2002 EPA study analyzing sources of air pollution during 1996 confirmed that gasoline vehicles and gasoline non-road equipment are the largest contributors to mobile source ambient concentrations of gaseous hazardous air pollutants (HAPs).

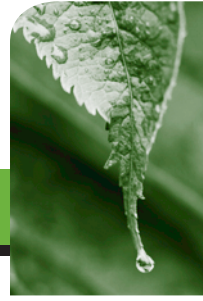
Because ethanol is inherently cleaner than gasoline, it emits less hydrocarbons, nitrogen oxides, carbon monoxide and hydrogen. As a result, ethanol is used to meet environmental and alternative fuel requirements set forth in the *Alternative Motor Fuels Act of 1988*, the *Clean Air Act Amendments of 1990*, the *Energy Policy Act of 1992*, and the *Energy Tax Act*. These public laws represent bipartisan efforts to reduce the environmental and economic impacts of gasoline consumption on society.

Ethanol has significant environmental benefits. Consider the following:

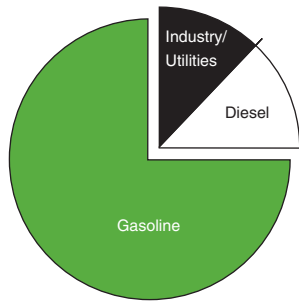
- Cars designed to run on high concentrations of ethanol have the potential to emit 80% to 90% less reactive hydrocarbons than advanced-technology gasoline cars.⁷⁷
- The federal oxy-fuel program (i.e., requires fuel oxygenate additives) reduced carbon monoxide violations by 90% in its first year (1992). Fuel ethanol was used in 89% (24 of 27) of the carbon monoxide oxy-fuel areas in 1995.⁷⁸
- In its first year of use (1995), the federal reformulated gasoline (RFG) standard (i.e., requires fuel oxygenate additives) helped reduce harmful air toxic pollution by over 25% and many of the compounds that create ozone pollution, or smog, by approximately 17%.⁷⁹ In 1995, ethanol was used in 13 of the 24 RFG areas (over 50%).⁸⁰

● Facts For The Record:

Greater use of ETBE will increase the use of domestic renewables, namely ethanol, and can make an important contribution to air quality – *Douglas Ford, President, AMOCO Oil Company, September 1993.*



Gasoline is the largest source of man-made carcinogens.



Source: U.S. Environmental Protection Agency

Using either E-85 (85% ethanol, 15% unleaded gasoline) or E-10 (10% ethanol, 90% unleaded gasoline) fuel greatly improves air quality and energy efficiency. Final results show a 35-46% reduction in greenhouse gas emissions and a 50-60% reduction in fossil energy use due to the use of ethanol as a motor fuel. — *Argonne National Laboratory (ANL), February 1998*

“Ethanol is a homegrown energy alternative. And ethanol produces a fuel that burns cleaner. And that’s good for our environment — just plain and simple, that’s good for our environment.” — President George Bush, June 13, 1989

“Transportation sources (i.e., burning gasoline and diesel) are responsible for 55.8% of outdoor air pollution. That includes 77.3% of the total carbon monoxide, 44.5% of the oxides of nitrogen, 3.3% of the sulfur oxides, 35.6% of volatile organic compounds (VOCs), and 26.3% of particulate matter (less than 10 microns), and 26.6% of lead emitted into the air.” — American Lung Association⁸¹

Ethanol helps remove harmful pollutants from the air we breathe

“Carbon monoxide is a colorless, odorless gas that is produced as a result of incomplete burning of carbon-containing fuels. Exposure to carbon monoxide reduces the blood’s ability to carry oxygen. Carbon monoxide exposures especially affect unborn babies, infants, and people with anemia or a history of heart disease.”
— American Lung Association⁸²

ETHANOL SUPPORTS FEDERAL CLEAN GASOLINE PROGRAMS

In response to public concerns regarding air quality and health, industry and government agreed to improved gasoline specifications in the *Clean Air Act Amendments of 1990* — creating oxygenated gasoline, and reformulated gasoline (RFG) standards. One common denominator in the cleaner gasoline standards is the addition of fuel oxygenates (e.g., ethanol). Clean gasoline, with oxygenates, is required in cities violating carbon monoxide and/or ozone air quality standards.

ETHANOL SUPPORTS THE FEDERAL OXY-FUEL CARBON MONOXIDE REDUCTION PROGRAM

EPA estimates transportation accounts for 66% to 80% of carbon monoxide (CO) emissions in our nation’s cities.⁸³ Tests conducted by EPA indicate ethanol blends are likely to reduce carbon monoxide emissions in vehicles by 10-30% depending on the vehicle’s combustion technology. The potential improvement in CO emissions over straight gasoline is significant.⁸⁴

The Auto/Oil Air Quality Improvement Research Program — a cooperative effort by the Big Three domestic automakers and 14 petroleum companies — conducted exhaustive tests over eight years and found that gasoline containing oxygenates, such as ethanol, reduces emissions of carbon monoxide.⁸⁵



RFG with Oxygenates, Like Ethanol, Substantially Reduces Harmful Gasoline Emissions

Air Toxics	-28%
Volatile Organic Compounds	-17%
Nitrogen Oxides	-3%
Carbon Monoxide	-13%
Sulfur Oxides	-11%
Carbon Dioxide	-4%
Particulate Matter	-9%
Reduced Cancer Risk	-20% to -30%

Source: Clean Fuels Development Coalition Technical Committee, California Air Resources Board

“Oxygenates like ethanol help fuels burn more completely, thereby reducing emissions of carbon monoxide, volatile organic compounds and toxic air emissions. Furthermore, RFG oxygenates displace benzene found in conventional gasoline, which reduces emissions of this known carcinogen as well.” — American Lung Association of Metropolitan Chicago, 1998 report

ETHANOL SUPPORTS THE FEDERAL OZONE AND AIR TOXICS REDUCTION (REFORMULATED GASOLINE) PROGRAM

In addition to the oxygenated fuel standard, the reformulated gasoline (RFG) specification also includes a limit on benzene (a known carcinogen), as well as a ban on heavy metal additives such as lead and manganese. Similar to the nation’s transition from leaded gasoline, RFG helps sustain the nation’s effort to improve air quality by reducing harmful fuel related emissions. RFG is sold in 18 states and the District of Columbia since 1995 and has reduced toxic gasoline related emissions by over 500,000 tons.

Burning fossil fuels contributes to greenhouse gases

“Global change is occurring. Climate change is a legitimate issue. We have to be smart in how we address this issue. It is in America’s best interests to cut our carbon emissions, and with that goal in mind I have sponsored legislation focusing on research and development of renewable energy sources including ethanol.” — Senator Chuck Hagel (R-NE), Lincoln Journal Star, November 11, 2000

“According to a five-laboratory study for the Department of Energy, cars fueled by biomass-generated ethanol generate approximately one-half of 1% of the carbon dioxide that is produced by the same car burning gasoline.” — Jim Woolsey, former Director, Central Intelligence, Chairman of the Advisory Committee, Clean Fuels Foundation, April 3, 1998, Fuel Ethanol in the 21st Century Seminar

“Emissions from transportation are growing faster than average for all emissions and are forecast to exceed 1990 levels by 26% in 2010 and by 42% in 2020” — Canadian Office of Natural Resources, Commissioned Study by S&T Consultants, Inc.

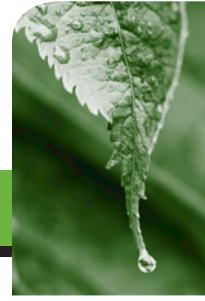
Human activities over the past 200 years, particularly fossil fuel combustion, have been resulting in significant emissions of anthropogenic (i.e., human-induced) greenhouse gases, primarily carbon dioxide. Emissions of these anthropogenic greenhouse gases have already altered the chemical composition of the atmosphere. This is creating an “enhanced greenhouse effect,” akin to an atmospheric blanket trapping gases beneath it. — *U.S. Environmental Protection Agency*⁸⁶

“If world energy consumption reaches the levels projected in the reference case, carbon emissions will exceed 1990 levels by 44% in 2010 and by 81% in 2020. By 2010, carbon emissions in the developing world are nearly equal to those in the industrialized world; and by 2020 emissions in the developing world would exceed those of the industrialized world by 27%.” — *International Energy Outlook 1998, April 1998*

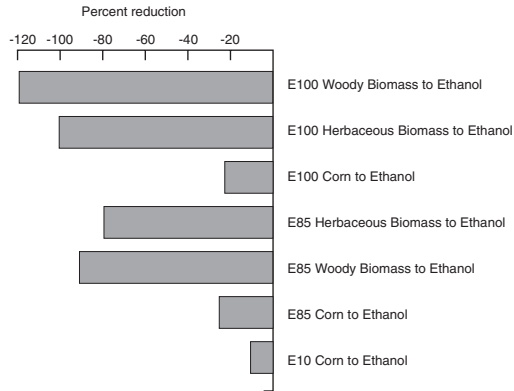
● Facts For The Record:

Fossil fuel use for energy must be reduced to lower greenhouse gases.

General Motors Corporation commissioned a “Well-to-Wheels” life cycle analysis of energy use and greenhouse gas emissions in 2002. That study compared 15 propulsion technologies and 75 different fuel pathways. The results were that “ethanol as E-85 reduces greenhouse gas emissions more than any other alternative fuel.”

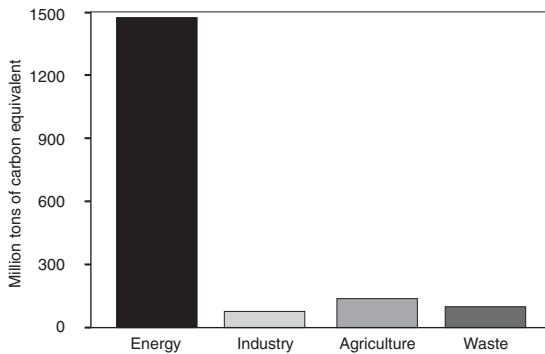


Greenhouse Gas Reductions Compared to Gasoline



Source: U.S. Department of Energy, Office of Fuels Development and Congressional Research Service

Total U.S. Greenhouse Gas Emissions by Source



Source: U.S. Environmental Protection Agency

"About three-quarters of the anthropogenic [man-made] emissions of CO₂ to the atmosphere during the past 20 years is due to fossil fuel burning. The rest is predominantly due to land-use change, especially deforestation." — United Nations Intergovernmental Panel on Climate Change, January 2001⁸⁷

"There is no debate among any sturged scientists of what is happening, the only debate is the rate at which it's happening." — Harvard University⁸⁸

"There's a lot of noise in the data. It is hard to isolate cause and effect. But there is now an effective consensus among the world's leading scientists and serious and well informed people outside the scientific community that there is a discernible human influence on the climate, and a link between the concentration of carbon dioxide and the increase in temperature ... The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven but when the possibility cannot be discounted and is taken seriously by the society of which we are part We in BP have reached that point." — Sir John Browne, Group Chief Executive, British Petroleum (BP America) — Stanford University, May 19, 1997

Technological advances

There has never been a better time than the present to aggressively expand the U.S. ethanol program. The impact of soaring crude oil prices and tight supplies was felt by the public during the spring of 2002 and again in 2003. Natural gas prices are at an all time high and we are also faced with tight supplies. Tapping into the vast potential of American agriculture and the fledgling biomass industry could allow the United States to shrug off those factors and supply clean and abundant energy, for both transportation fuel and stationary power.

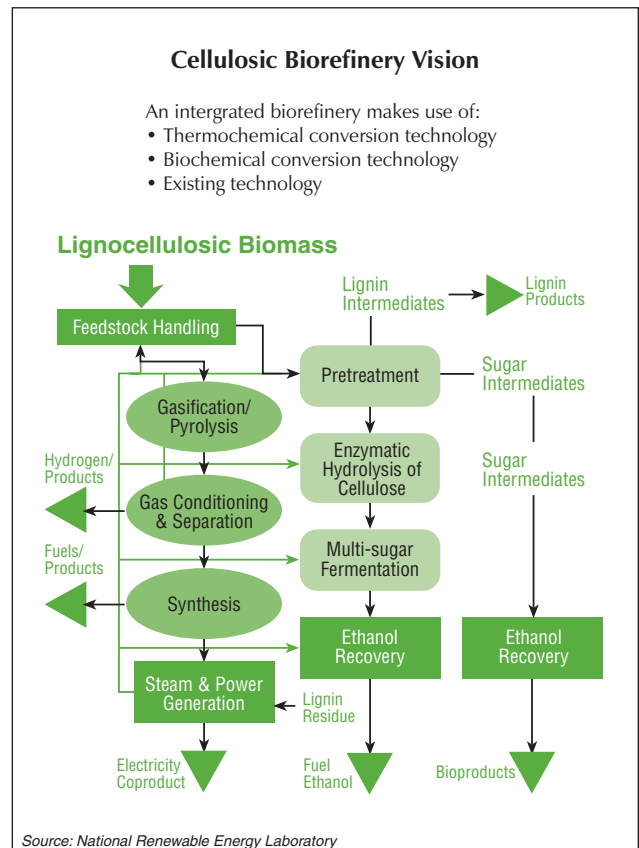
Agriculture is the nation's largest industry and major creator of wealth in this country. Agriculture is also responsible for nearly 25% of the nation's employment.⁸⁹ A vision of the 21st century must include a sustainable rural economy and diverse supply of clean transportation fuels and utility fuels. Fuel ethanol offers the win, win, win possibilities needed in the 21st century.

Farmers win by diversifying income opportunities, as new crops such as switchgrass and fast-growing wood crops are developed;

Agricultural processors win by benefiting from increased quantities of feedstocks, which help make their use more economical;

The environment wins by lessening the emphasis upon traditional row crops as a source of farm income because of new diverse planting opportunities that require fewer inputs. In addition, switchgrass and fast-growing woody crops are highly compatible with improved wildlife habitats and land conservation. And the overall lessening of the nation's reliance on fossil fuels and switch to cleaner burning biomass energy sources will improve air quality;

The nation wins as we increase our energy self-reliance by developing a national energy strategy that is not reliant on imported and expensive petroleum.



Facts For The Record:

Researchers estimate an average of 2.45 billion metric tons of cellulosic biomass could be available in the U.S. each year for fuel conversion — providing a potential ethanol yield of 270 billion gallons (twice the total U.S. gasoline consumption). — *National Renewable Energy Laboratory*

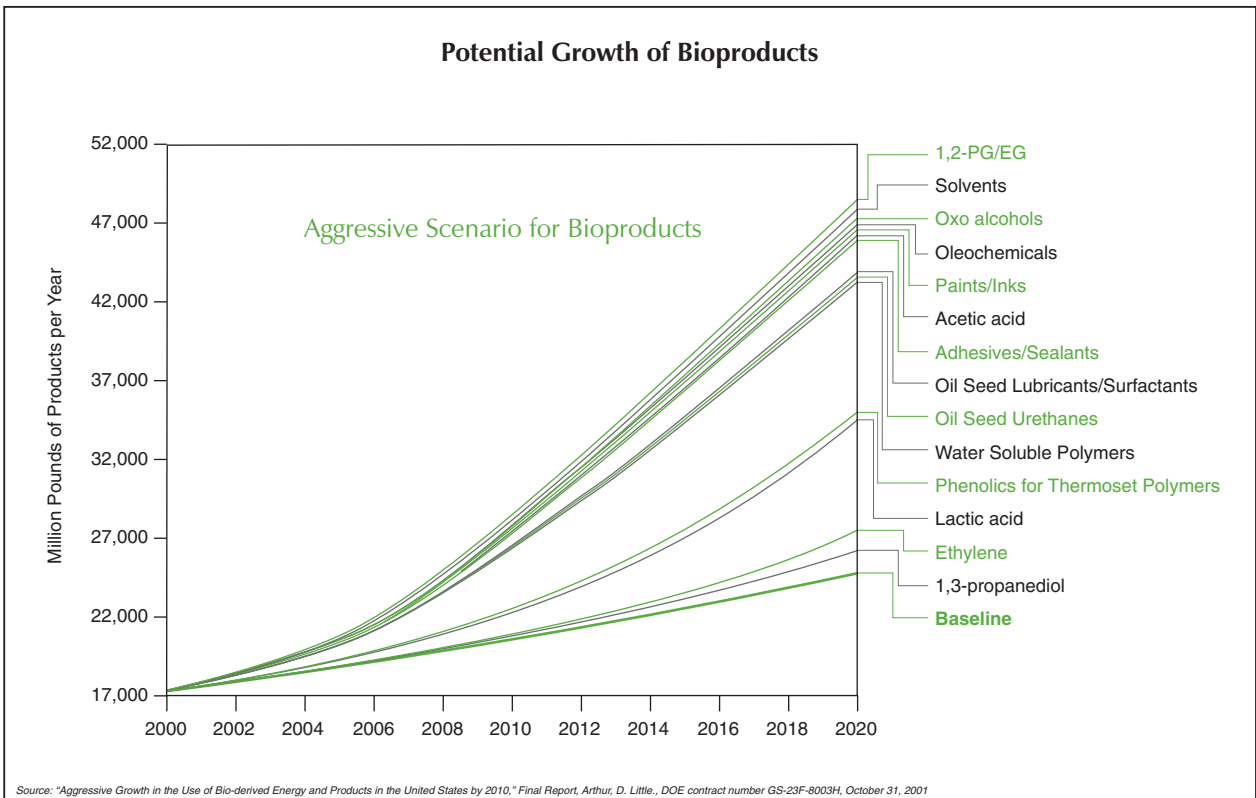


The U.S. Department of Energy (DOE) National Biofuels Program and the U.S. Department of Agriculture are working on a joint initiative seeking to cost-effectively produce ethanol and other fuels and chemicals from biomass resources such as agricultural and forestry residues or fast growing trees and grasses. This requires efficient technology to extract and use the sugars in cellulose and hemicellulose -- the fibrous bulk of plant material. Developing this technology is the primary focus of the Biofuels Program.

The future success of not just biofuels but all biobased products may be in the development of biorefineries. Just as the petroleum industry evolved to produce a wide range of products from oil in refineries, biomass can be processed to produce various fuels, chemicals, and power. The added value of these products to the production of ethanol could significantly improve biomass ethanol economics.

“On tomorrow’s farm . . . some of the new energy crops will look like hay, but they’ll feed ethanol plants, not horses. The woodlot out back might provide energy for lighting or cooking. But farmers won’t burn it themselves. They’ll sell it to a local power plant or biogas company.” – National Renewable Energy Laboratory, The American Farm, Harnessing the Sun to Fuel the World, March 1994

“We can look forward to the day when a ton of biomass will be traded like a barrel of oil is today.” – Energy Secretary Bill Richardson, October, 1998

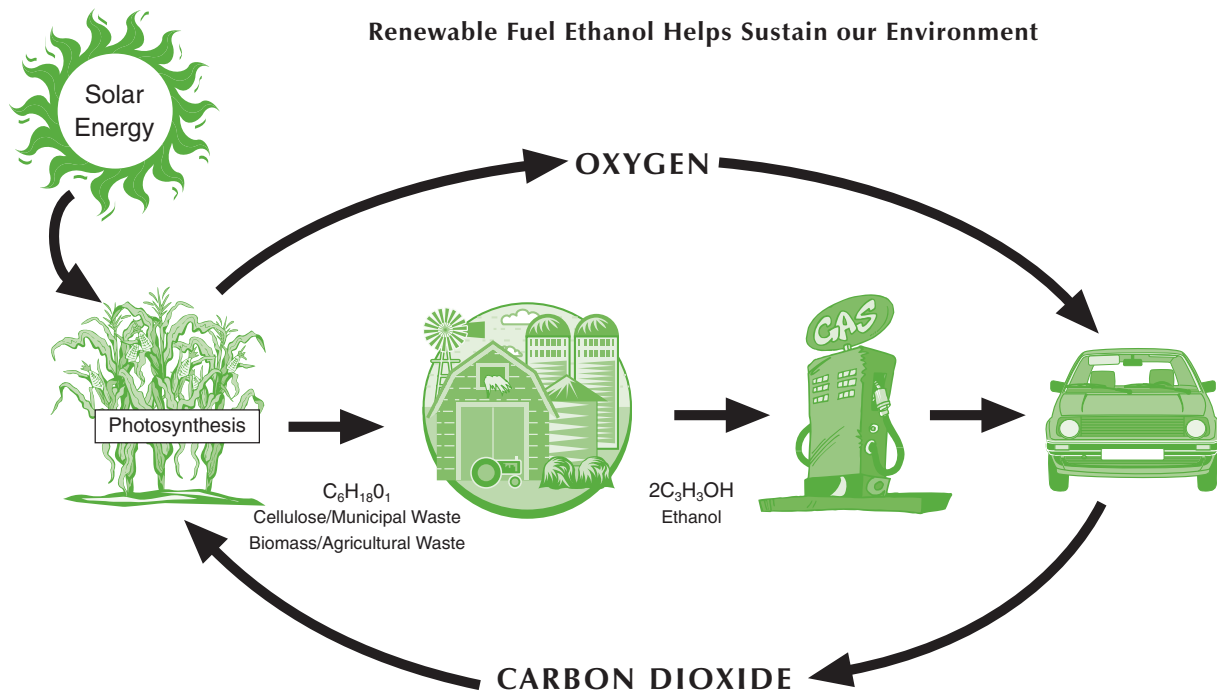


Fuel ethanol has vast potential: The Brazilian example

“The economic well-being and future security of this nation depend upon maintaining and building long-term energy security and strengthening the domestic energy industry.”
– President Ronald Reagan, January 25, 1988

Every Administration and every Congress has been criticized for the lack of an energy policy. Republicans blame Democrats and Democrats blame Republicans for not having alternatives to petroleum in order to blunt the impact of shortages and price hikes. Many experts argue that all it takes is a commitment by government to develop such alternatives. While any petroleum displacement program must begin with goals, the programs that put teeth into those goals are key. Brazil is a shining example of how a commitment by government can help realize goals for ethanol production and use.

In 1975, Brazil began an ambitious, three-stage, national alcohol fuel program designed to reduce its dependence on imported oil. Today, this program has been hailed as an overall success.⁹⁰





BRAZIL'S ETHANOL PROGRAM HAS:⁹¹

- Created a market where Brazilian gasoline-powered vehicles operate on 20-25 volume percent ethanol;
- Created a market with 4.3 million vehicles using hydrated ethanol (95.5 vol%) and another 17 million cars utilizing blends of ethanol for a combined fleet equivalent of 7.25 million cars;
- Created 640,000 direct jobs;
- Created approximately 9 million indirect jobs;
- Reduced oil imports by nearly 70% between 1979 and 1992;
- Increased the manufacturing of ethanol-powered vehicles to 96% of domestic vehicle production;
- Improved the Brazilian trade balance from \$3.5 billion in 1975 to over \$14.9 billion in 1992;
- Reduced Brazil's reliance on imported oil from 43.3% in 1985 to 21.7% in 1992;
- Increased ethanol production to a high of 4.2 billion gallons per year; and
- Now 18,000 of Brazil's 22,000 fuel stations sell fuel ethanol.

*The United States transportation sector depends on petroleum for 97% of its energy needs. The largest contributor to the U.S. balance of trade problem is imported oil. By 2020, up to 74% of the oil we use will be imported, costing the U.S. \$173 billion per year.*⁹² — United States Department of Energy

"When considering the economic benefits of ethanol production, ethanol production costs in Brazil are equivalent to crude oil at \$19 per barrel." — World Bank⁹³

"Ethanol is by far the most energy efficient method of producing liquid transportation fuels. There is a net energy gain for ethanol production, versus an energy loss for other fuels, as follows: ethanol 125%, refined gasoline 85%, methanol 55%, and coal gasification 45%." — U.S.D.A., Minnesota Dept. of Agriculture

The nation needs a diverse supply of domestic clean burning transportation fuels

“From my company’s perspective, the transition to ethanol has been seamless. Virtually every one of our terminals is capable of receiving gasoline products, including ethanol, by rail or barge. Receiving production this way is not problematic ... receiving tankloads of ethanol is no different than receiving shipments of gasoline. It is done all the time and presents no additional burden to gasoline marketers. Once at the terminal, blending ethanol with gasoline is equally uncomplicated. Blending equipment for gasoline additives exists at every fuel terminal in the country, merely augmenting these systems to allow for ethanol blending is neither complex nor time consuming. I see no reason why my experience with ethanol in the Northeast is unique or could not be duplicated.” — Leo Liebowitz, Chairman of the Board, Getty Petroleum, September 1999

It can be argued that one of the reasons alternative fuels as a group have failed to make a meaningful dent in the overall transportation fuel pool is due to the enormous task of changing our fuel infrastructure. Natural gas, methanol, electricity, and other fuels require special handling and equipment. Furthermore, their use in dedicated vehicles, i.e. specially made vehicles that can only operate on that particular fuel, limits their practicality and acceptance.

Ethanol, however, is a unique fuel because of its diversity in application. Ethanol is typically blended with gasoline in 10% volumes, which requires no changes to the refueling systems or the vehicle. It can also be used in volumes up to 85% in cars that have slight modifications but are available to the general public and do not cost any more than a gasoline-only vehicle. Finally, it can be used to make ETBE, which provides significant emission reductions. With these many uses ethanol is indeed the most "flexible" of all the alternative fuels and most importantly, the easiest to handle. New opportunities are emerging for ethanol to be used as an aviation fuel with considerable success already demonstrated.

Many petroleum refiners give the impression that ethanol is a difficult product to handle and has numerous problems related to its use. Interestingly, many of these companies that publicly resist ethanol use do so while offering ethanol blends at the pump.

Other, more progressive oil companies fully support ethanol and dismiss claims that it presents unique problems. For example, Leo Liebowitz, Chairman of the Board of Getty Petroleum, has stated that ethanol fits nicely into the company’s marketing in the Northeast.



The American Petroleum Institute has been a staunch supporter of ethanol in recent years as a means of eliminating boutique fuels and expanding the nation's fuel supplies.

Although the chemical makeup of ethanol results in an affinity for water and thus limits its ability to be transported in pipelines, many other oil companies will attest to the fact that ethanol presents no particularly unique problems. The transition, therefore, to large quantities of ethanol can be achieved with much greater ease than any of the other alternative fuels. Furthermore, the multiple use options make it a much more attractive investment.

The transportation network of tomorrow will utilize many resources, both conventional and renewable. New fuel efficient vehicles and smart highways will improve the efficiency of conventional fuels. Almost any type of current and future vehicle can be fueled from biomass. The flexibility of this important, domestic and renewable resource could provide liquid "bio-fuels" for internal combustion engines, electric and hybrid vehicles, and fuel cell vehicles.

Biofuels are alcohols, ethers, and other chemicals made from cellulosic biomass—renewable resources

"One additional development has been that pipeline operators are now examining the feasibility of shipping ethanol from its port of entry to California terminals via pipeline. This would dramatically reduce or eliminate transport truck delivery of ethanol to terminals and reduce transportation expense." — Ethanol Supply/Demand and Logistics, May 2000 Review and Update, Downstream Alternatives, Inc.

such as fast growing trees, grasses, aquatic plants (microalgae), and waste products such as agricultural and forestry residues, and municipal and industrial wastes.

With further advances in technology, these domestically produced, biomass resources could provide up to 50% of future U.S. light duty vehicles' fuel requirements. Some of the biofuels used to fuel cars and trucks include ethanol and biodiesel. Other alcohol fuels such as methanol, which is currently produced from fossil fuels, also could be produced from renewable biomass and classified as biofuels.

● **Facts For The Record:**

According to the Energy Information Administration's Energy Outlook 2003, petroleum will continue to be the primary area of demand for the next two decades, far outpacing stationary power fuels.

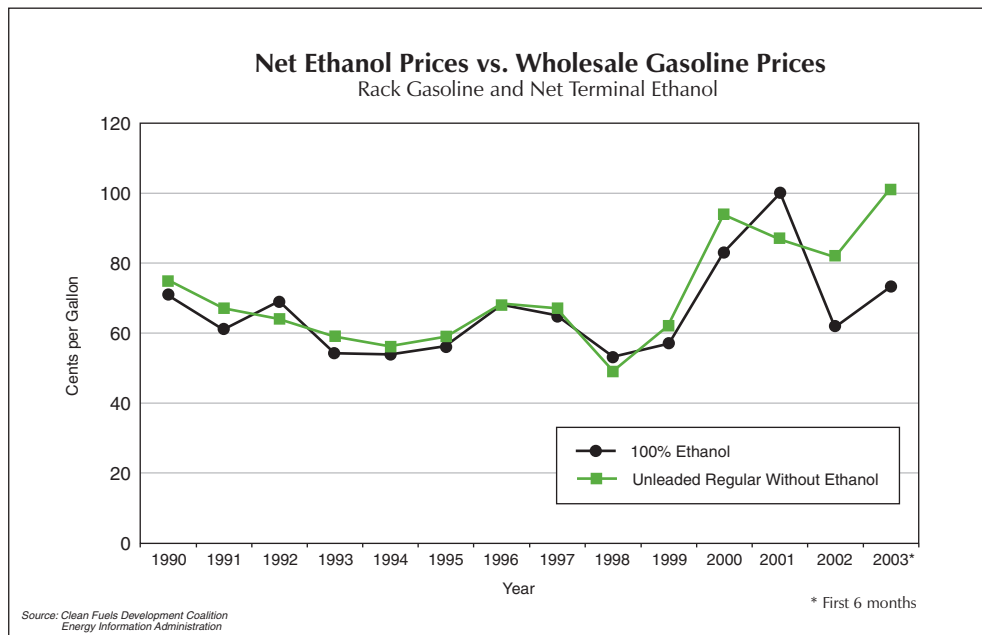
Ethanol cost and outlook

Ethanol generally costs more to produce than gasoline. Those higher costs are offset by benefits associated with its production as discussed throughout this book. In recognition of those benefits, Congress taxes ethanol at a lower rate in an effort to make it competitive with wholesale gasoline. That tax incentive has been effective in that net ethanol has been less expensive than gasoline to purchasers. Since those purchasers are petroleum companies that blend it with their gasoline, the ultimate price to consumers varies. The finished ethanol gasoline blend is a premium product so marketers will often charge more for this higher-octane fuel. At the same time, ethanol blends can often be found at a selling price lower than conventional gasoline. There are too many variables in the motor fuel market to definitively state that ethanol blends are more or less expensive than unblended gasoline but it has always been competitive. Constantly improving efficiencies of ethanol facilities

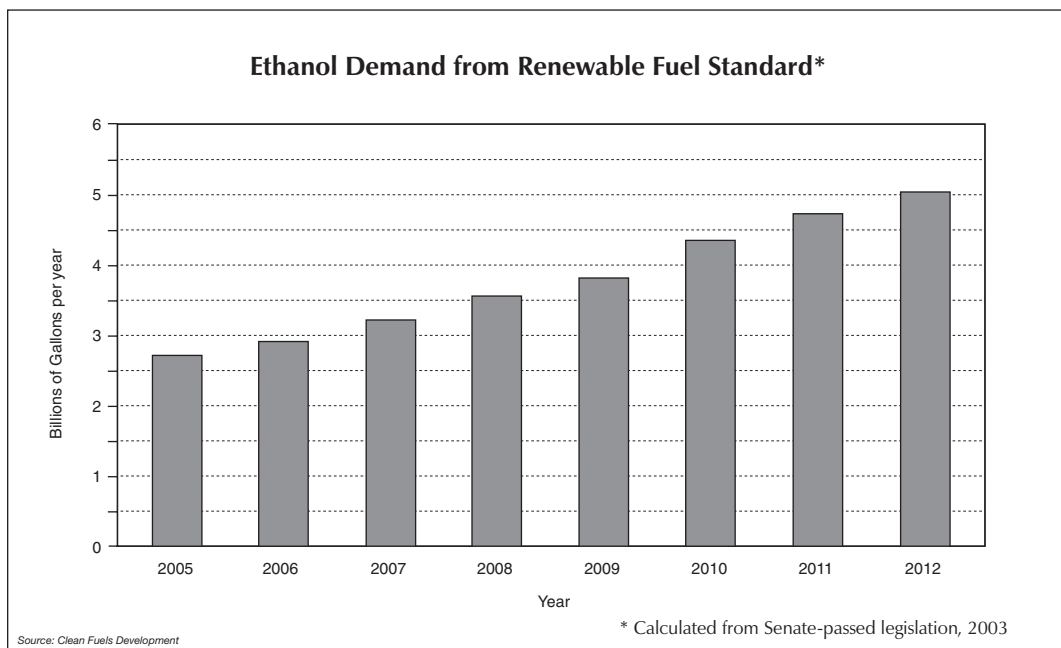
“Scientists today are researching more efficient ways of making ethanol and other biomass fuels. I have always supported that.” – President Bill Clinton, December 2000

has resulted in lower ethanol production costs. Exciting research being conducted by the Department of Energy as well as a number of private companies could dramatically impact the cost of ethanol production and open up an entirely new generation of feedstocks.

Under the current regulatory structure ethanol is an economical fuel. With advances in agriculture and biomass technologies it will become even more so.



Looking ahead



Despite ethanol's many wonderful attributes, competing against an established and heavily subsidized petroleum industry presents a great challenge. For that reason Congress recognized the need to provide incentives both in terms of the reduced tax rate and by linking ethanol with important environmental programs, such as reformulated gasoline and carbon monoxide control.

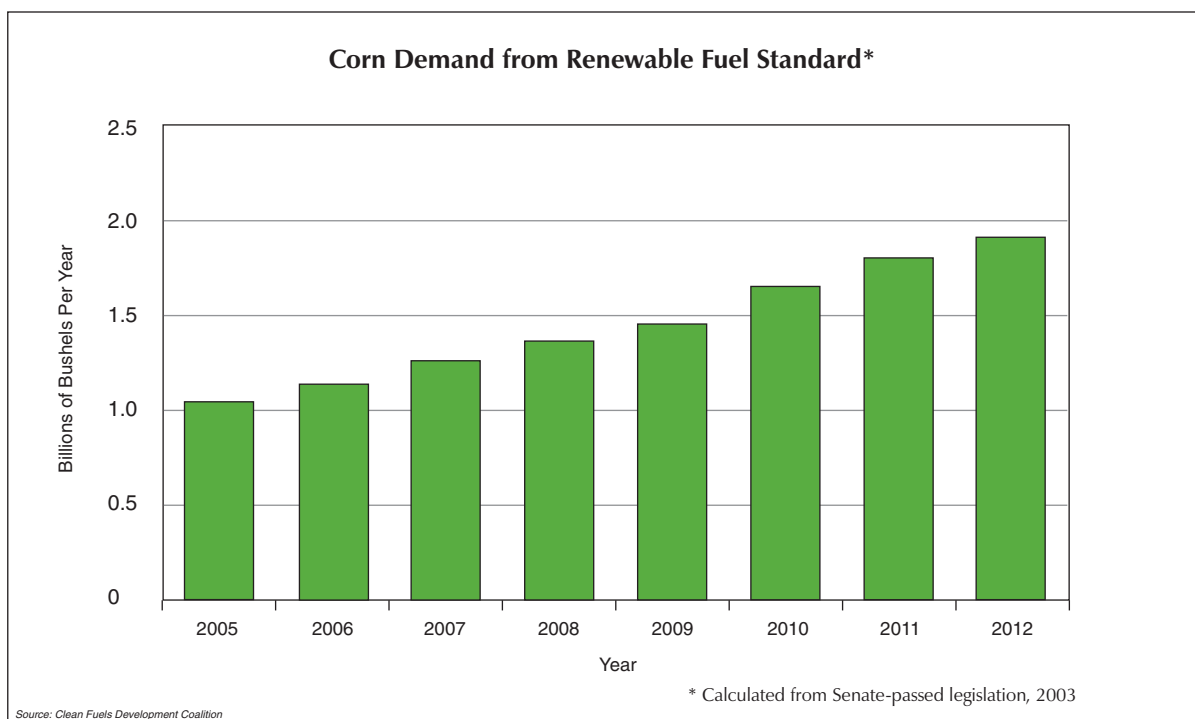
Many people now believe that today's environmental, agricultural, and energy security challenges call for a new and expanded approach to help address all of these public policy issues. Such an approach would be based on a flexible requirement spread across the entire gasoline pool that would require a small percent of fuels to be renewably derived. Stimulating ethanol demand in this manner would be similar to the renewable portfolio concept being considered for the electric utility industry whereby a certain percentage of

the power generated must come from renewable resources. Proponents of this approach believe that establishing such a baseline requirement solidifies alternative energy programs and insulates them against the ups and downs of the market. A credits and trading program allows these fuels to be used where they make the most sense and does not force their usage in places where compliance may be difficult. This approach appears to have a broad bipartisan appeal as well. Legislation introduced by Senate Democratic Leader Tom Daschle of South Dakota and Republican Agriculture Committee Chairman Richard Lugar of Indiana embraces this approach. In fact, analysis of this legislation by the U.S. Department of Agriculture (USDA) confirms the effectiveness of the "demand-pull" approach. The USDA study finds that such a program would result in additional corn demand of 2 billion bushels resulting in the production

Looking ahead

of 4.6 billion gallons of ethanol. An expansion of the ethanol industry of that magnitude would result in millions upon millions of dollars in additional economic benefits and thousands of jobs across the country. Supporters of the renewable fuels standard also point to the continuing improvements in conventional fuels in automobiles which may lessen the need for clean burning additives in the future. Some of the private sector analysis also illustrate that even if the entire reformulated gasoline program were to remain intact and ethanol were the sole oxygenate available to refiners, the ethanol demand would still be significantly less than the modest renewable fuels standard proposal being advocated by many in industry and agriculture.

According to a 1999 analysis by the U.S. Department of Energy's Office of Transportation Technologies, "Increasing the market share of alternative and replacement transportation fuels would have significant energy security and oil market benefits for the United States. Some of these benefits will occur even if use of the fuels is induced by regulations, subsidies, or demonstration programs. Additional energy security benefits would be generated if the fuels are competitive with petroleum fuels in at least some market segments."



Questions and answers about ethanol

WHAT IS FUEL ETHANOL?

- Ethanol, otherwise known as ethyl alcohol, alcohol, grain-spirit, or neutral spirit, is a clear, colorless, flammable oxygenated fuel.
- Ethanol is mixed with gasoline to create ethanol/gasoline blends at volume levels of 5.7%, 7.7%, or 10%. These fuel formulations are approved by all automakers.
- Ethanol is used to increase octane and improve the emissions quality of gasoline as required by the *Clean Air Act Amendments of 1990*.
- Ethanol is used as an alternative fuel to replace gasoline. In this application, a 85% ethanol and 15% gasoline mixture is used in flexible fuel vehicles to meet *Clean Air Act* and *Energy Policy Act* crude oil displacement goals.
- Ethanol is used in the manufacture of ethyl tertiary butyl ether (ETBE). ETBE is used to increase octane and improve emissions from gasoline as required by the CAAA.
- In the future, ethanol can be used as a fuel to power fuel cells.

“GM (Saturn) recommends that you use gasolenes with these blending materials, such as ethanol.” — GM Owners Manual

*“We are satisfied that the blend will make a satisfactory motor fuel. A blend of 10% alcohol and 90% gasoline makes a better motor fuel than an all-gasoline fuel, it produces an anti-knock fuel, quicker starting, more pep, less carbon deposits and in all probability some greater mileage. A blend of 15% alcohol and 85% gasoline makes still a better fuel and a blend of 20% alcohol and 80% gasoline is still better.”
— Results of research by the Iowa State College chemistry department in 1932 as reported to the Iowa Legislature*

HOW DOES ETHANOL PERFORM IN MY VEHICLE?

All automobile manufacturers approve the use of ethanol/gasoline blends. Approval of ethanol blends is found in the owners manual under references to refueling or gasoline. General Motors Corporation states in its owners manual they recommend the use of fuel oxygenates, such as ethanol, when and where available.

Fuel ethanol blends are sold in nearly every state from Alaska to Florida.⁹⁴ Fuel ethanol blended gasoline has

achieved nearly 100% marketshare of all gasoline sold in certain carbon monoxide (oxygenated gasoline) and ozone nonattainment areas (reformulated gasoline, RFG). Minnesota has adopted a statewide oxygenated fuel program that has resulted in ethanol being blended in over 95% of the State’s gasoline. Therefore, fuel ethanol is successfully used in all types of vehicles and engines that require gasoline.

Questions and answers about ethanol

IS ETHANOL-BLENDED FUEL BAD FOR FUEL INJECTORS? NO!

Ethanol or ethanol-blends have never contributed to burning or fouling of port fuel injectors. Some components in gasoline, such as olefins, have been identified as causing deposits that can foul injectors. But since ethanol burns 100% and leaves no residue,

it cannot contribute to the formation of deposits. Ethanol blends actually keeps fuel injectors cleaner – helping improve engine performance. It does not increase corrosion, nor will it harm any seals or valves.

WILL ETHANOL-BLENDED FUEL CAUSE VAPOR LOCK? NO!

Vapor pressure specifications of gasoline continue to be lowered by state and federal statute, virtually eliminating the vapor lock problems that were reported

in the past. Additionally, all major auto manufacturers now have in-tank fuel pumps, which are not subject to vapor lock like the older in-line fuel pumps.

WILL ETHANOL BLENDS MAKE ENGINES RUN HOTTER? NO!

Ethanol actually helps keep your engine cooler, since the ethanol in the fuel combusts at a lower

temperature. In fact, many high-powered racing engines use pure alcohol for that very reason.

WILL ETHANOL-BLENDED FUEL PLUG UP FUEL LINES? NO!

Occurrences of plugged fuel filters are virtually non-existent now. The “cleansing” nature of ethanol blended fuels can actually keep your fuel system cleaner – and lead to improved performance. In the case of dirty fuel systems, contaminants and residues that have been deposited by previous gasoline fill can be loosened. That

residue can get caught in the fuel filter. In older cars, especially those made prior to 1975, replacing the filter solves the problem from that point on – and once your car’s fuel system is clean, your car’s performance should improve as well.



CAN ETHANOL BLENDS BE USED IN OLDER CARS? YES!

The formulation of gasoline has changed dramatically over the past few years without affecting the performance of older cars. Many older cars were designed to run on leaded gasoline, with the lead providing necessary octane performance – and the lead oxides that were formed during combustion provided a cushion that reduced wear on non-case-hardened valve seats.

When lead was phased out of gasoline, oil companies added toxic chemicals to raise the octane rating – and other additives to replace the “lubrication” value of lead. Ethanol added to gasoline increases the octane level of the final fuel by three points – and it does so using a natural, renewable additive that works well in older engines.

CAN ETHANOL BLENDED FUELS BE USED IN SMALL ENGINES? YES!

Ethanol blended fuel is perfectly acceptable in lawn mowers, snowmobiles, and other small engines. Manufacturers of this equipment know that more than 40% of the gasoline sold across the U.S. contains oxygenates, such as ethanol, so they’ve made certain that their engines perform on these clean-burning fuels.

Ethanol blends may be used anywhere that unleaded gasoline is used – from ATVs to chainsaws, from lawn mowers to personal watercraft. Virtually every small engine manufacturer, including Briggs & Stratton, Honda, Toro/Lawnboy, Kohler, and Snapper, approves the use of ethanol blended fuel in its equipment.

RFG with Fuel Oxygenates, Like Ethanol, Works in all Engine Types	
Passenger Vehicles	Approved
Motorcycles	Approved
Small Engines	Approved
Boats	Approved
Portable Power Equipment Manufacturing Association	Approved
Yamaha	Approved
Mercury Marine	Approved
Harley Davidson	Approved
Briggs & Stratton	Approved
Sears	Approved
Honda	Approved
Kawasaki	Approved

Questions and answers about ethanol

HOW MUCH DOES ETHANOL COST COMPARED TO GASOLINE?

The cost of producing ethanol is generally higher when compared to the market price of gasoline. The majority of production costs are the result of the cost of the feedstock (i.e., grain). The average cost of producing ethanol ranges from \$0.90 to \$1.25 per gallon. The \$0.52 per gallon of ethanol excise tax exemption

provides the price differential between the wholesale price of gasoline (e.g., \$0.60 per gallon) and the higher cost of producing ethanol (\$1.10). Therefore, the ethanol incentive allows ethanol to be competitive with gasoline (e.g., \$1.10 ethanol - \$0.52 tax incentive = \$0.58 per gallon). (See page 38)

DOES ETHANOL PRODUCTION AFFECT OUR NATION'S FOOD SUPPLIES? NO!

The production of ethanol does not translate into less grain available for food. Farmers do not grow more or less grain based on ethanol production. Approximately 90% of the corn produced in the U.S. is fed directly to animals. Ethanol production helps farmers remain profitable, thereby ensuring adequate food supplies in the future. The processes of producing ethanol for fuel and beverage alcohol utilize only the starch portion of the grain, leaving intact the high-value, high-protein, high-vitamin content feed products called distillers grains or corn gluten feed.

Ethanol production yields many valuable human and animal feed co-products. A bushel of corn used in the fuel ethanol process produces 1.6 pounds of corn oil, 10.9 pounds of high protein feed (distillers dried grains, or DDG), 2.6 pounds of corn meal, and 31.5 pounds of starch that can be converted to beverages or sweeteners, or used to produce 2.5 gallons of ethanol.⁹⁵ Co-products from the milling of corn have important nutritional properties that add value to feed rations and livestock feeding programs.⁹⁶ The use of corn co-products provides a cost-competitive feed on a per-head basis. Corn co-products compete with other feed ingredients, helping to reduce overall costs to the producer.⁹⁷

DOES ETHANOL HAVE A POSITIVE ENERGY BALANCE, EVEN CONSIDERING THE FUEL AND ENERGY USED TO GROW, HARVEST, AND PROCESS CORN? YES!

Corn ethanol production is energy efficient, as indicated by an energy ratio of 1:24, that is for every Btu dedicated to producing ethanol, there is a 24% energy gain.⁹⁸

If farmers and industry were to use all the best technologies and practices, the net energy ratio would be 2.21:1.⁹⁹

Moreover, producing ethanol from domestic corn stocks achieves a net gain in a more diverse form of energy. Ethanol production utilizes abundant domestic energy supplies like coal and natural gas to convert corn into a premium liquid fuel that can replace petroleum imports by a factor of 7 to 1.¹⁰⁰

FOR MORE INFORMATION

Federal

Alternative Fuels Data Center	www.afdc.nrel.gov
Department of Commerce	www.doc.gov
Department of Energy	www.doe.gov
Argonne National Laboratory	www.anl.gov
Bartlesville Project Office National Oil Program	oil.bpo.gov/bpo-oil.html
Brookhaven National Laboratory	suntid.bnl.gov
Clean Cities	www.ccitites.doe.gov
Energy Efficiency & Renewable Energy Network	www.eren.doe.gov
Fossil Energy Worldwide Web Network	www.fe.doe.gov
Lawrence Berkeley Laboratory	www.lbl.gov
Lawrence Livermore Laboratory	www.llnl.gov
Los Alamos National Laboratory	www.lanl.gov
Morgantown Energy Technology Center	www.metc.doe.gov
National Renewable Energy Laboratory	www.nrel.gov
Office of Science and Technical Information	apollo.osti.gov
Sandia National Laboratories	www.sandia.gov
Department of Treasury	www.ustreas.gov
Energy Information Administration (EIA)	www.eia.doe.gov
Energy-Related Web Servers	www.fe.doe.gov/moweb.html
EPA	www.epa.gov
Office of Mobile Sources	www.epa.gov/OMSWWW/omshome.htm
Federal Register-Searchable Evt'l Subsets	www.epa.gov/epahome/EPAFR-Search.html
General Accounting Office (GAO)	www.gao.gov
General Printing Office	www.access.gpo.gov
US House of Representatives-Internet Law Library	www.pls.com
Links to House members	www.house.gov/memberWWW.html
Gopher	gopher.house.gov
Internal Revenue Service	www.irsustreas.gov
Library of Congress	Lcweb.loc.gov
Office of Technology Assessment	www.ota.gov
US Senate	www.senate.gov/index.html
Thomas - Congressional Web Site	thomas.loc.gov
White House	www.whitehouse.gov

To receive a list of all House e-mail addresses, send a message to: congress@hr.house.gov

To receive a list of all Senate e-mail addresses, send a message to: webmaster@scc.senate.gov

This book is intended to be a broad source of information on a range of different ethanol issues. For more specific information on ethanol and the policies and programs that drive its use, check out the Clean Fuels Development Coalition's web site at www.CleanFuelsDC.org, or check out some of the other online resources for information on ethanol.

FOR MORE INFORMATION

Related organizations

Ethanol Across America	www.ethanolcrossamerica.net
American Coalition for Ethanol	www.ethanol.org
Clean Fuels Development Coalition	www.cleanfuelsdc.org
Citizen Action	www.essential.org/CMEP
Clean Air Network	www.naturalgas.com
Clean Fuels Foundation	www.cleanfuels.org
CONEG Policy Research Center Inc.	www.coneg.org
E-10 Unleaded	www.e10unleaded.com
Environmental Education on the Internet	www.nceet.snre.umich
Ethanol Producers and Consumers	www.ethanolmt.org
Global Climate Coalition	www.worldcorp.com/dc-online/gcc/index.html
Governors' Ethanol Coalition	www.ethanol-gec.org/
Interstate Oil and Gas Compact Commission	www.iogcc.oklaosf.state.ok.us
Let's Get With It, Nebraska! E-10 Unleaded with Ethanol	www.e10unleaded.com
National Conference of State Legislatures	www.ncsl.org/index.htm
National Ethanol Vehicle Coalition	www.e85fuel.com
National Technology Transfer Center	www.nttc.edu
National Renewable Energy Laboratory	www.nrel.gov
Natural Resources Defense Council	www.nrdc.org
Nebraska Ethanol Board	www.NE-Ethanol.org
New England Instate Water Pollution Control Commission	www.neiwpcc.org
New York State Technology Enterprise Corp.	www.nystec.com
Northeast Regional Biomass Program	www.nrbp.org
Northeast States for Coordinated Air Use Management	www.nescaum.org
Petroleum Internet Resources	www.slb.com/petr.dir/.guthrey.html
Press Release Center	ino.com
Public Citizen-Critical Mass Energy Project	www.essential.org/CMEP/
Renewable Fuels Association	www.EthanolRFA.org
Search the Federal Register	ssdc.ucsd.edu/gpo/fedfld.html
Society of Automotive Engineers	www.sae.org
State and Local Government on the Net	www.piperinfo.com/piper/state/states.html
State Search	www.state.ky.us/nasire/NASIREhome.html
USA CityLink	usacitylink.com//default.html
Government Web Servers	www.eit.com/web/www.servers/government.html

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- ⁹⁹"How Much Energy Does it Take to Make a Gallon of Ethanol?" Institute for Local Self-Reliance. December 1992.

APPENDIX A: About Our Sponsors

AG PROCESSING INC.

Ag Processing Inc (AGP) is a farmer-owned cooperative engaged in the procurement, processing, marketing, and transportation of grains and grain products. Since its formation in 1983, AGP has been committed to the success of its owners. Today, that is 243 local cooperatives and eight regional cooperatives, representing 250,000 farmers from 16 states throughout the United States and Canada.

AGP operates nine soybean processing plants including six plants in Iowa, located at Eagle Grove, Emmetsburg, Manning, Mason City, Sergeant Bluff, and Sheldon. Other AGP processing plants are located at Dawson, Minnesota, St. Joseph, Missouri, and Hastings, Nebraska. The Hastings plant is the first farmer-owned soybean processing facility in that state.

For more information contact:

Ag Processing Inc.
PO Box 2047, Omaha, NE 68103-2047-7801
2700 West Dodge Road, Omaha, NE 681549
PHONE: 800-247-1345/402-496-7809
WEB: www.agp.com

AMERICAN COALITION FOR ETHANOL

The American Coalition for Ethanol works with a wide range of groups in support of ethanol, including commodity organizations, rural electric cooperatives, ethanol producers, grain cooperatives, businesses and individuals. ACE is organized to promote and expand the development of the ethanol industry, and to reduce America's dependence on foreign oil imports; to provide an alternative use for farm products; to create a public awareness of the uses and benefits of ethanol, at the same time dispelling fears and erroneous product information; to support legislative efforts to promote ethanol usage and to do all other things necessary or expedient for the promotion and increased usage of ethanol.

For more information contact:

American Coalition for Ethanol
PO Box 85102; 2500 S. Minnesota Ave.,
#200, Sioux Falls, SD 57105
PHONE: 605-334-3381
FAX: 605-334-3389
WEB: www.ethanol.org

BROIN COMPANIES

At the Broin Companies, we set the standards for the ethanol industry. Our companies provide turnkey development, design, engineering, construction, management and marketing services for our capital partners. The Broin Companies combine unparalleled experience and proven performance to create the most successful and profitable ethanol plants in the world.

For more information contact:

Broin Companies
Kenyon Gleason, Director of Communications,
2209 E. 57th St. North, Sioux Falls, SD 57104
PHONE: 605-965-2200
FAX: 605-965-2203

EMAIL: kenyongleason@broin.com

For information on ethanol marketing contact:

Ethanol Products, 316-303-1380

For information on DDGS marketing contact:

Dakota Gold Marketing, 1-888-327-8799

WEB: www.broin.com

CHIEF ETHANOL FUELS

Chief Ethanol Fuels is the largest and longest operating ethanol plant in Nebraska. A subsidiary of Chief Industries, Chief Ethanol Fuels began as a 10 million gallon per year facility in 1985 and has evolved into one of the most efficient ethanol facilities in the United States. The plant has increased capacity steadily over the last decade, currently producing more than 62 million gallons annually. Chief Ethanol has been an integral part of the Hastings, Nebraska community, providing a value added outlet for local grain and creating numerous direct and indirect jobs.

For more information contact:

Roger Burken, General Manager or
Mike Barwig, Director of Sales and Marketing

PHONE: 402-463-6885

EMAIL: burken@chiefind.com

WEB: www.chiefind.com

COBANK, ACB

CoBank offers a broad range of flexible loan programs and specially tailored financial services. The bank provides short, intermediate and long-term financing at variable and fixed interest rates. CoBank also offers cash investment services, letters of credit, leasing services and interest rate risk management services. With over \$30 billion in assets, CoBank has been the leading lender to some

of America's most successful businesses for over 50 years. We specialize in cooperatives, agribusinesses, rural utility and agricultural export financing. We are also one of the largest sources of funding for ethanol facilities, with over 10 years active participation in the industry. As a borrower-owned bank operating on a cooperative basis, a substantial portion of our earnings are annually returned to our customers in the form of patronage refunds.

For more information contact:

Tom Houser at 800-346-5717 Ext. #2013 or
Jeff Kistner at 800-346-5717 Ext. #2025
11837 Miracle Hills Drive, Suite 200,
Omaha, NE 68154

WEB: www.cobank.com

COLORADO CORN ADMINISTRATIVE COMMITTEE

In 1987 the Colorado Corn Growers Association (CCGA) worked to establish a marketing order for corn. By statewide referendum, corn growers passed a 1 cent per bushel assessment on corn produced in Colorado. Managed by the 11 farmer-member, farmer-elected board and alternates of the Colorado Corn Administrative Committee (CCAC), the funds are invested in programs to stimulate long-term marketing opportunities through education, research and development, and market promotion.

For more information contact:

Colorado Corn
127 22nd St., Greeley, CO 80631

PHONE: 970-351-8201

WEB: www.coloradocorn.com

ED&F MAN ALCOHOLS INC.

ED&F Man Alcohols Inc. is a US subsidiary of ED&F Man Holdings Ltd., a UK based, employee owned, international commodity trading firm established in 1783, specializing in the trade of sugar, molasses, alcohol, cocoa, nuts and spices, as well as liquid products storage and liquid feeds. ED&F Man Alcohols Inc. markets fuel ethanol in North America produced in the group's two ethanol plants in Jamaica as well as for other ethanol producers both internationally and domestically.

For more information contact:

PHONE: 805-965-1478

EMAIL: Wmaloney@aol.com or
alcohols@edfman.com

WEB: www.edfman.com

APPENDIX A: About Our Sponsors

ETHANOL PRODUCTS, LLC

Ethanol Products provides marketing, forward contracting, risk management and distribution capabilities for ethanol plants throughout the United States. We maintain a fleet of transportation equipment and have ethanol storage in key markets. Our proprietary scheduling and invoicing system provides our customers with an integrated means to manage their ethanol shipments. With these capabilities we create a strong marketing force and reliable supply source for ethanol producers and consumers.

For more information contact:

111 South Ellis, Wichita, KS 67211

PHONE: 316-303-1380

EMAIL: Wichita@EthanolProducts.com

2209 E 57th St. N; Sioux Falls, SD 57104

PHONE: 605-965-2206

EMAIL: BobScott@EthanolProducts.com

WEB: www.ethanolproducts.com

FAGEN, INC.

Fagen, Inc. is the leading design-build construction firm in ethanol plant construction. Since 1988, Fagen, Inc. has been involved in the development and construction of over 33 ethanol plants nationwide from grass roots construction through expansions. With the addition of Fagen Engineering LLC and Fagen Management LLC, Fagen offers total plant services. Fagen, Inc. has the experience and workforce necessary to take any size project from conception to operation. With the addition of Fagen Engineering, our customers have a single-source for every civil, structural, mechanical, and electrical aspect of their project's scope. In short, there is no project we can't perform with excellence.

For more information contact:

Fagen, Inc.

Ron Fagen, President & C.E.O.

PHONE: 320-564-3324

Wayne Mitchell, Vice President

PHONE: 320-564-3324

Walter Kittrell, Project Developer

PHONE: 402-564-6526

WEB: www.fageninc.com

GENENCOR INTERNATIONAL, INC.

For over two decades, Genencor has been a catalyst for the biobased economy and committed partner for ethanol producers seeking biotechnology solutions. As a leader in

the global ethanol market, we've developed enzymes to help convert grain starches into ethanol, lessening petroleum dependence, reducing emissions, and providing farmers with greater value. We're also working with the U.S. Department of Energy on a new generation of enzymes to convert cellulosic biomass to fermentable sugars.

For more information contact:

Genencor International, Inc.

200 Meridian Centre Blvd., Suite 300;

Rochester, NY 14618

PHONE: 800.847.5311

FAX: 585.256.5286

WEB: www.genencor.com.

ICM

For the ethanol industry, ICM provides professional engineering services, process guarantees, consultation, fabrication, installation, construction management, distillers grain marketing, ethanol marketing, ethanol plant management, permitting assistance, safety assurance and performance benchmarking services. ICM and its partner companies manufacture the industry's most energy efficient dryers, create environmentally beneficial water treatment systems for ethanol plants, and develop local synergies for energy and feed co-products.

For more information contact:

Jeff Roskam, Senior Vice-President

310 N. First Street; Colwich, KS 67030

PHONE: 316-796-0900

WEB: www.icminc.com

KANSAS CORN GROWERS ASSOCIATION

The Kansas Corn Growers Association is a membership-based organization that represents Kansas producers in legislative and regulatory issues in both Topeka and Washington. KCGA works with the Kansas Corn Commission to provide market development, promotion and education services including efforts to increase the production, usage and availability of ethanol within the state of Kansas.

For more information contact:

Jere White, Executive Director

PO Box 446, 109 W. 4th St.,

Garnett, KS 66032

PHONE: 785-448-6922

FAX: 785-448-6932

EMAIL: jwhite@ksgrains.com

WEB: www.ksgrains.com/corn

KANSAS GRAIN SORGHUM PRODUCERS

KGSPA represents its grower members in legislative and regulatory issues on the state and national levels. The association works with the Kansas Grain Sorghum Commission to provide market development, promotion and education services to growers. Because most of the ethanol produced in Kansas is made from grain sorghum, KGSPA is active in projects to increase the production and use of ethanol in the state.

For more information contact:

Jere White, Executive Director

PO Box 446, 109 W. 4th St.,

Garnett, KS 66032

PHONE: 785-448-6922

FAX: 785-448-6932

EMAIL: jwhite@ksgrains.com

WEB: www.ksgrains.com/sorghum

KATZEN INTERNATIONAL, INC.

KATZEN International, Inc. is a developer and designer of process technology for the ethanol and related industries, worldwide. For more than 5 decades, KATZEN has been the leader at the cutting edge of technology. The firm consists of highly experienced chemical, biochemical and mechanical engineering and design professionals. Their R&D and design-engineering efforts are continually developing the superior technology solutions that create ongoing improvement in the bottom-line performance of the industry.

For more information contact:

KATZEN International, Inc.

PHONE: 513-351-7500

EMAIL: projects@katzen.com

WEB: www.katzen.com

APPENDIX A: About Our Sponsors

MARYLAND GRAIN PRODUCERS UTILIZATION BOARD

The Maryland Grain Producers Utilization Board (MG PUB) was established by referendum in 1991 to administer the Maryland Grain Checkoff Program and distribute the annual revenue primarily to expand grain utilization and open up new markets for grain. MG PUB collects half of one percent of the net value of grain grown in Maryland. These funds are used to increase the profitability of Maryland grain production and to improve public understanding of agriculture using checkoff funds to support promotion, education, and research. Expanding the production and use of ethanol is a high priority of MG PUB.

For more information contact:

Lynne Hoot, Executive Director, Maryland Grain Producers Association (MGPA) and Maryland Grain Producers Utilization Board (MG PUB)
53 Slama Road, Edgewater, MD 21037
PHONE: 410-956-5771
FAX: 410-956-0161
WEB: www.marylandgrain.com

NATIONAL ETHANOL VEHICLE COALITION

The National Ethanol Vehicle Coalition is dedicated to the advancement of the use of 85 percent ethanol as a form of alternative transportation fuel. The use of renewable-domestic transportation fuels such as 85% ethanol provides economic opportunity, advances environmental stewardship, and promotes agricultural profitability. The NEVC is supported by the domestic automakers, the Governors' Ethanol Coalition, state and national commodity groups, farmer owned ethanol production facilities, and individual members.

For more information contact:

Phillip Lampert, Executive Director
3118 Emerald Lane, Suite 100
Jefferson City, MO 65109
PHONE: 573-635-8445
CELLULAR: 573-690-1229 cell
FAX: 573-635-5466 fax
WEB: www.e85fuel.com

NATIONAL FARMERS UNION

National Farmers Union was founded in 1902. National Farmers Union is a general farm organization with a membership of nearly

300,000 farm and ranch families throughout the United States. For more than 100 years, National Farmers Union's primary goal has been to sustain and strengthen family farm and ranch agriculture. The key to this goal has been Farmers Union's grassroots structure in which policy positions are initiated locally. The policy process includes the presentation of resolutions by individuals or a group of Farmers Union members, followed by possible adoption of the resolutions at the local, state and national levels. National Farmers Union believes that good opportunities in production agriculture are the foundation of strong farm and ranch families and that strong farm and ranch families are the basis for thriving rural communities. Vibrant rural communities, in turn, are vital to the health and economic wellbeing of the entire U.S. economy.

FOR MORE INFORMATION CONTACT:

NFU (Denver) - 11900 East Cornell Ave.,
Aurora, CO 80014-3194
PHONE: 303-337-5500
TOLL FREE: 800-347-1961
FAX: 303-368-1390
NFU (DC) - 400 North Capitol St. NW, Suite
790, Washington, DC 20001
PHONE: 202-554-1600/Fax: 202-554-1654
WEB: www.nfu.org

NEBRASKA CORN BOARD

The mission of the Nebraska Corn Board is to enhance the profitability of the corn producer by developing, carrying out and participating in programs of market promotion, research, and education. Our vision: Nebraska Corn - the first choice for a consistent supply of quality corn by global customers and by Nebraska value-added industries who process the equivalent of 100% of corn produced in Nebraska, with greater farmer participation in all related industries and through broad-based cooperation.

For more information contact:

Nebraska Corn Board
301 Centennial Mall South, 4th Floor,
P.O. Box 95107, Lincoln, NE 68509-5107
PHONE: 800-632-6761 (NECORN1) or
402-471-2676 (CORN)
FAX: 402-471-3345
EMAIL: d.hutchens@necorn.state.ne.us
WEB: www.nebraskacorn.org

NEBRASKA ETHANOL BOARD

The Nebraska Ethanol Board is a state agency established in 1971 to promote the development and utilization of ethanol fuels. The Nebraska Ethanol Board is an active participant in several national organizations including the Clean Fuels Development Coalition. The Board supports a variety of marketing programs and actively works with companies to develop ethanol plants in Nebraska.

For more information contact:

Nebraska Ethanol Board
PO Box 94922, Lincoln, NE 68509
PHONE: 402-471-2941
FAX: 402-471-2470
WEB: www.ne-ethanol.org

NEBRASKA PUBLIC POWER DISTRICT

Nebraska Public Power District (NPPD) is the largest producer and wholesaler of electrical power in the State of Nebraska. NPPD is committed to the growth and economic development of rural Nebraska. NPPD works to provide economic development assistance to value-added agricultural projects such as the ethanol production and support industries. NPPD's Economic Team includes five Certified Economic Developers with nearly 90 years of combined experience in helping companies with their site location process. Information about available industrial sites, Nebraska communities, and plant location assistance is available at: www.sites.nppd.com NPPD's Economic Development Team will also provide customized responses to specific requests.

For more information contact:

Brian Wilcox, Industrial and Business Account Consultant; 1414 15th Street,
P.O. Box 499; Columbus, NE 68602-0499
PHONE: 402-563-5347/800-282-6773,
Ext. 5347
FAX: 402-563-5466
CELLULAR: 402-750-3868
E-MAIL: bkwilco@nppd.com
Dennis G. Hall,
CEd, Economic Development Manager,
PHONE: 402-563-5534/800-282-6673,
Ext. 5534
FAX: 402-563-5466
CELLULAR: 402-562-0893
E-MAIL: dghall@nppd.com
WEB: www.nppd.com

APPENDIX A: About Our Sponsors

NOVOZYMES NORTH AMERICA INC.

Novozymes, the world leader in enzyme production, continues to prove that biological processes can lead to business success in a symbiosis between industrial efficiency and sustainable development. We craft biological solutions - sometimes as products, sometimes as services, sometimes simply as knowledge, but most often as a combination of them all. One of our primary focus areas is providing leading enzyme products and services for fuel ethanol. Novozymes is committed to developing specific and economical process solutions for liquefaction, saccharification (SSF), and fermentation. We are also devoted to developing the next generation of cellulases for economical glucose production from cellulosic feedstocks. Contact us to learn more about how we are helping to prepare the fuel ethanol industry of today for a better tomorrow.

For more information contact:
Novozymes North America, Inc.
77 Perry Chapel Church Road,
Franklinton, NC, 27525
PHONE: 1-800-879-6686
FAX: 919-494-3485
EMAIL: enzymesna@novozymes.com
WEB: www.novozymes.com

REEVE AGRI-ENERGY

Reeve Agri Energy of Garden City, Kansas is one of the longest running, and most innovative fuel ethanol production facilities in the United States. The Reeve facility has received numerous awards for being the first integrated facility in the U.S. to combine a cattle feedlot with an ethanol facility and a fish farm, utilizing waste heat from the ethanol fermenters. For years the Reeve facility has been a tourist site in Kansas due to the unique aspects of the facility. Reeve continues to sell high quality ethanol products today.

For more information contact:
Lee Reeve at Reeve Agri-Energy,
P. O. Box 1036, Garden City, KS 67846
PHONE: 620-275-7541
FAX: 620-275-8393

SOUTH DAKOTA CORN UTILIZATION COUNCIL

Agriculture is South Dakota's leading industry and corn production is an important component of South Dakota's agricultural economy. In fact, South Dakota corn growers produced

370.6 million bushels of corn in 2001. The (SDCGA) works to promote corn and improve corn profitability through influencing public policy and legislative efforts. Through SDCGA's efforts at the state legislature, we have lobbied state leaders for fully funding the state's ethanol producer incentive which supports the development of ethanol in our state and provides thousands of jobs in rural America. Market development, promotion and education, and research funded by the (SDCUC) have created new markets for South Dakota corn growers in the state. In fact, 1 out of every 3 rows of corn grown in South Dakota will be used for ethanol production in the state, as ethanol production will grow to over 340 million gallons of ethanol. SDCUC is also taking a leading role by helping to develop our livestock industry with our "It's About Time" advertising campaign.

For more information contact:
South Dakota Corn
3801 South Western Avenue, Suite 100,
Sioux Falls, SD 57105
PHONE: 605-334-0100
FAX: 605-334-0505
WEB: www.sdcorn.org

SOUTHERN STATES ENERGY BOARD

Southern States Energy Board (SSEB) is a non-profit interstate compact organization created in 1960. The Board's mission is to enhance economic development and the quality of life in the South through innovations in energy and environmental programs and technologies. SSEB endeavors to reach the goal of sustainable development by implementing strategies that support its mission. SSEB develops, promotes and recommends policies and programs that protect and enhance the environment without compromising the needs of future generations. SSEB's membership includes: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, U.S. Virgin Islands, Virginia, and West Virginia.

For more information contact:
NORCROSS OFFICE:
Southern States Energy Board,
6325 Amherst Court, Norcross, Georgia 30092
PHONE: 770-242-7712
FAX: 770-242-0421
WASHINGTON, DC OFFICE: Southern States

Energy Board,
P.O. Box 34606, Washington, DC 20043
PHONE: 202-667-7303
FAX: 202-667-7313
WEB: www.sseb.org

UNION PACIFIC RAILROAD

Union Pacific is the largest railroad in North America, operating in the western two-thirds of the United States. The railroad serves 23 states, linking every major West Coast and Gulf Coast port and provides service to the east through its four major gateways in Chicago, St. Louis, Memphis and New Orleans. Additionally, Union Pacific operates key north/south corridors and is the only railroad to serve all six gateways to Mexico. UP also interchanges traffic with the Canadian rail systems. Union Pacific's Ethanol Pipeline offers customers access to the ethanol producers in the Midwest and the most direct rail route to the refineries and truck racks in the California market. Union Pacific is ideally positioned to provide the highest level of service and lowest cost structure. Producers will retain the freedom to control their own equipment and logistics while receivers will retain the independence to control their ethanol supply.

For more information contact:
Matt Pick, Business Manager
PHONE: 402-271-3390
Tina (Minino) Wehrbein
PHONE: 402-271-2058
WEB: www.uprr.com

WYOMING ETHANOL, LLC

Wyoming Ethanol, LLC
PO Box 8043, Boise, ID 83707
PHONE: 800-669-3607
FAX: 800-497-8280
EMAIL: jtglancey@spro.net

The Clean Fuels Development Coalition would like to acknowledge the assistance of the National Defense Council Foundation for their contribution of information drawn from their new report "Imported Oil: America's Achilles Heel".

For further information on the NDCF report, please contact Milton Copulos, 703-836-3443, or visit www.ndcf.org.

About this book

The *Fuel Ethanol Fact Book* is a compilation of hundreds of technical summaries and research reports from across the scientific, academic and technical community which offer support for the expansion of the ethanol industry through continuation and extension of the federal fuel ethanol tax incentive and establishment of a National Renewable Fuels Standard. This exhaustive research is representative of government, industry, and academic opinion on the benefits of fuel ethanol production to the nation, the environment and the public. We hope you find this information useful and informative.

If you have any questions, or need additional information, call us at the:
Clean Fuels Development Coalition in the Washington, DC area at (301) 718-0077,
or e-mail cfdcinc@aol.com.



The Clean Fuels Development Coalition is a non-profit organization dedicated to the development of alternative fuels and technologies to improve air quality and reduce U.S. dependence on imported oil. The broad CFDC membership includes ethanol producers, agricultural interests, automobile manufacturers, state government agencies, and engineering and new technology companies. Since its beginning in 1988, the Coalition has become a respected source of information for state, local and federal policymakers as well as private industry on a range of transportation, energy, and environmental issues.

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CFDC CLEAN
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DEVELOPMENT
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