

THE ETHANOL FACT BOOK

A Compilation of Information About Fuel Ethanol



PUBLISHED BY
CFDC

CLEAN
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COALITION

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EPIC ethanol promotion
and information council

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To Our Readers:

Originally published in 1996, the *Ethanol Fact Book* is prepared each new Congress to provide public policy makers, industry leaders, the media, related industries, and consumers with an historic and current foundation of peer-reviewed and resource-based knowledge about ethanol.

Since the first *Ethanol Fact Book* was published, ethanol has assumed an increasingly important role in the American energy mix. The industry has increased annual production capacity to more than 7 billion gallons per year, with billions more under development. These ethanol plants have pumped billions of dollars into the American economy, stemming the massive transfer of wealth to foreign countries that is the result of our addiction to oil. In so doing, we have seen a resurgence in rural America. And, along with the ethanol plants springing up from America's cornfields, we are witnessing a technology revolution that promises to dramatically expand the base for ethanol production. Municipal, forest, and agriculture wastes are close to commercial viability as ethanol feedstocks. The efficiency of ethanol production increases every day, with more ethanol being produced and less energy being used to produce it.

This substantial increase in ethanol production has been seamlessly integrated into the motor fuel pool and America's car companies are doing their part by producing flexible fuel vehicles (FFV) that can operate on up to 85% ethanol, with more than 6 million of these FFVs on the road today. Every car on American roads can operate on 10% ethanol blends. Ethanol replaces some of the most harmful components of gasoline like benzene, while reducing carbon monoxide emissions. With climate change of paramount concern around the globe, ethanol is sure to play an increasing role in strategies to reduce carbon dioxide (CO₂) emissions.

Ethanol is a complex and multifaceted issue that is very often misunderstood and therefore misrepresented. It is often misrepresented by design, and often misunderstood due to time and information resource constraints. The *Ethanol Fact Book* will provide you with the knowledge to make informed decisions based on the thousands of hours of research that have gone into this document. The *Ethanol Fact Book* contains over 100 footnotes, references to numerous related organizations, and website links to provide you additional sources for more information.

We would like to acknowledge the member organizations of the Clean Fuels Development Coalition and all of our other sponsors for their support of this important document. Together, we will answer your questions about ethanol tax incentives and production, energy security and oil import reductions, economic impacts and benefits to the Treasury, greenhouse gas reduction and environmental benefits, and advancements in cellulose conversion technologies and flexible fuel vehicle production. We also address many other technical questions and long misunderstood myths about E85, food vs. fuel, energy balances, and the ability of ethanol to positively impact our nation's energy future. The consensus calling for more ethanol is growing everyday. Now in our 20th year, CFDC will continue to lead the way in driving demand for clean burning renewable fuels like ethanol.

We hope you can join us in this effort!

Sincerely,



Douglas A. Durante; Executive Director
The Clean Fuels Development Coalition
www.cleanfuelsdc.org

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Ethanol Has a Long History of Bipartisan Support



“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, 1980

“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 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 H. Bush, June 13, 1989

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

— President Bill Clinton, October 1996

Finding Common Ground

Ethanol produced from renewable resources has a long history of support from the White House and in the United States Congress. When the transportation sector began the conversion from animal power to the internal combustion engine in the early years of the twentieth century, and some federal and state policies failed to reflect two fundamental facts: that crude oil supplies were exhaustible, and that huge quantities of imports could have ruinous effects on the national economy.

In 1973 the United States suffered its first domestic energy 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 uncertainty.

The first Congressional response to the petroleum crisis was the Energy Tax Act of 1978.¹ It was designed to stimulate the growth of alternatives to gasoline made from crude oil by granting gasoline blended with 10% ethanol a total exemption from the four cent per gallon federal fuel excise tax.² The program worked and every president since Jimmy Carter has supported the development of a domestic fuel ethanol industry.³

Facts For The Record:

■ The Energy Tax Act, Energy Security Act, Alternative Motor Fuels Act, Clean Air Act, and Energy Policy Act 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, 2003, 2005 and most recently in 2007.

The Evolution of Successful Legislation

Following another oil crisis in 1979, the Iranian Hostage Crisis, and the U.S. grain embargo of the 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 1980⁴ and the Energy Security Act of 1980⁵ 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 1980's, Congressional supporters continued the effort to build a strong, domestic energy industry. In 1982, the Surface Transportation Assistance Act⁸ raised the federal gas tax from four cents to nine cents and increased the partial exemption for 10% ethanol blends to five cents of the nine cent tax on gasoline. In 1984, the Tax Reform Act⁹ raised the ethanol exemption to six cents per gallon. In 1990, the Omnibus Budget Reconciliation Act¹⁰ decreased the ethanol tax incentive from six cents to five cents and extended the incentive to 2000.

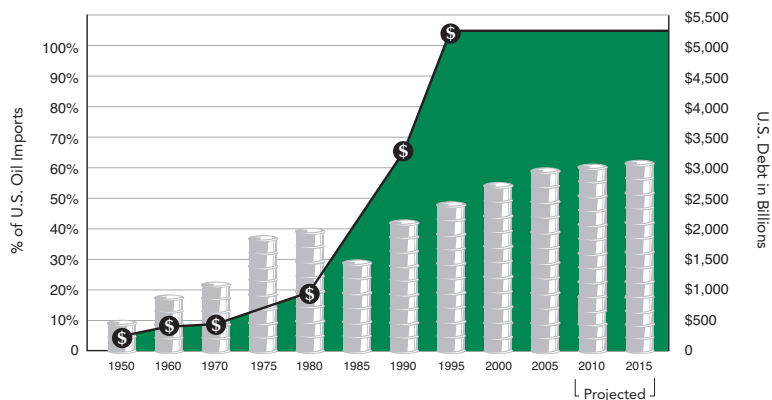
“President Clinton and I will strongly and actively oppose any effort to eliminate the ethanol program. We challenge Congress to do what is right for our farmers, our rural communities, our environment, and our national security.”

— Vice President Al Gore, April 20, 1998

“It’s in our vital interest to diversify America’s energy supply — the way forward is through technology. We must continue investing in new methods of producing ethanol using everything from wood chips to grasses, to agricultural wastes... To reach this goal, we must increase the supply of alternative fuels, by setting a mandatory fuels standard to require 35 billion gallons of renewable and alternative fuels by 2017 — and that is nearly five times the current target.”

— President George W. Bush,
State of the Union Address, January 23, 2007

Trends in Crude Oil Imports and the Federal Defense Budget Must Be Reversed



Source: U.S. Department of Energy, U.S. Department of Commerce

Ethanol Policy Represents Two Decades of Federal and State Cooperation

“The Governors’ Ethanol Coalition, which represents 30 Governors [36 today], believes that increasing dependence on foreign oil is a major risk to the nation’s energy, economic, and environmental security. The safest and cheapest way to mitigate these risks is to set and achieve a goal of providing at least 5% of the nation’s transportation fuel from ethanol by 2010, and to produce at least 8 billion gallons of ethanol a year by 2012. As soon as practical thereafter, the nation should produce at least 10% of its transportation fuel from ethanol and biodiesel.”

— Governors’ Ethanol Coalition, April 12, 2005
in a letter to President George W. Bush

“Fuel ethanol reduces crude oil imports and is environmentally friendly; it also helps meet other national public policy goals.”

— Congressional Research Service, 1993¹³

Ethanol Policy Exemplifies Leadership and Bipartisan Collaboration

In 1988, the Alternative Motor Fuels Act¹¹ created programs for research, development, and demonstration projects on both vehicles and fuels, plus fuel economy credits for automakers to produce Flexible Fuel Vehicles (FFVs) capable of running on any combination of gasoline or ethanol (up to 85% or E85). This legislation cleared the way for the manufacture of the first 20,000 vehicles capable of using 85% ethanol blends and today, more than six million of these vehicles are on U.S. roads.

By passing amendments to the Clean Air Act in 1990,¹² Congress explicitly recognized that changes in motor 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 vehicle emissions in highly polluted U.S. cities. The new standards required the use of fuel additives called oxygenates, including ethanol, in areas of the country with high carbon monoxide pollution during the winter months and year-round in areas with high ozone pollution. The Energy Policy Act of 1992 set a national goal of 30% penetration of alternative fuels, including ethanol, in the light-duty vehicle market by 2010 and required some vehicle fleets to purchase alternative fuel vehicles.

Consensus Continues to Increase the Use of Ethanol

In 2004, the American Jobs Creation Act¹⁴ streamlined the system of federal excise tax exemptions for ethanol blends with a tax credit called the Volumetric Ethanol Excise Tax Credit (VEETC). The Jobs Act also redirected billions of fuel tax dollars to the Highway Trust Fund, altered the Small Ethanol Producers Credit, and opened new markets to ethanol blends across the United States.

The Energy Policy Act of 2005¹⁵ created the Renewable Fuel Standard (RFS) requiring the use of ethanol and other biofuels in the U.S. fuel supply and creating tax incentives for E85 fueling infrastructure. Collectively, this history of Congressional initiatives and incentives has provided a solid foundation for this rapidly growing energy industry.

Already in the 110th Congress in 2007, there have been numerous bills introduced by a broad base of bipartisan supporters to advance biofuels.¹⁶

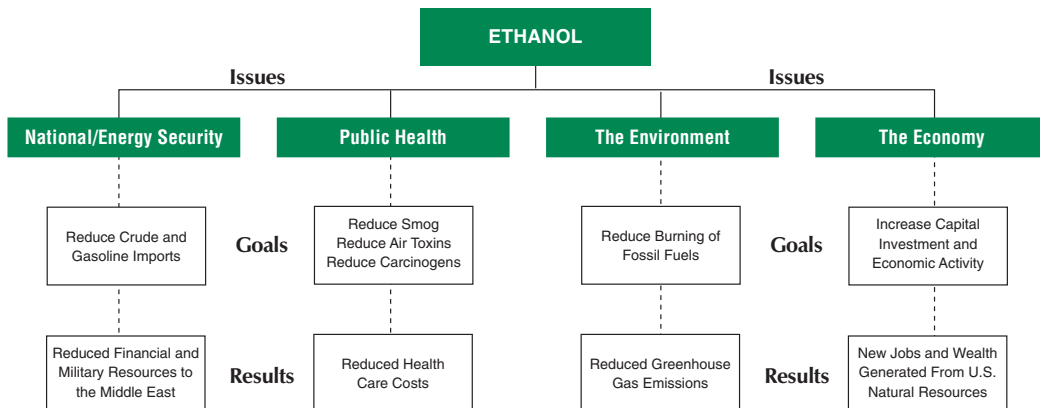
“It is indeed a testament to the spirit of compromise in the U.S. Senate that all these groups representing often divergent constituencies and interests can come together to create a product that benefits all... any viable energy strategy must serve a variety of national goals... this agreement establishes a renewable fuels program to nearly triple the use of renewable fuels like ethanol and biodiesel over the next ten years.”

— U.S. Senate Majority Leader Thomas A. Daschle (D-SD), original author and architect of the Renewable Fuel Standard, introducing the RFS, Congressional Record, March 13, 2002

“The heart of America’s geostrategic problem is reliance on imported oil in a market that is dominated by volatile and hostile governments. We can start to break petroleum’s grip right now. The energy plan presented here (expand the RFS) is a package of proposals that would dramatically improve American’s security posture. It would also provide more jobs for Americans instead of sending billions of dollars to hostile countries, support our farms instead of foreign terrorists, and promote green fuels over fossil fuels.”

— Senator Richard Lugar, March 2007

Fuel Ethanol Is Helping Meet National Public Policy Priorities



The Fuel Ethanol Program is a Success

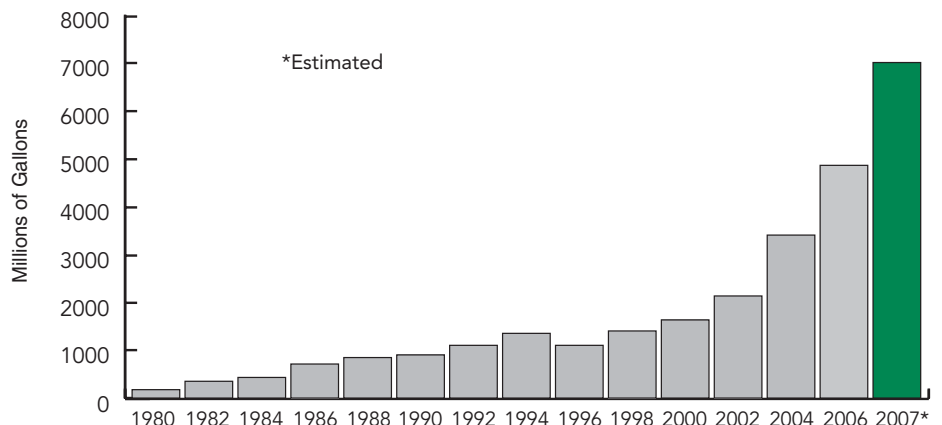
Since passage of the first federal tax incentives to encourage ethanol production:

- The U.S. ethanol industry now has the capacity to produce an estimated 7 billion gallons per year of high octane, clean-burning motor fuel. Nearly 10 billion gallons of annual operating capacity is projected to be on line by 2008.¹⁷
- Over \$10 billion has been invested by the private sector in ethanol production facilities.¹⁸ This number is expected to reach \$40 billion by 2009.
- One hundred and twenty six ethanol plants located in 19 states are operating. Nearly 100 more are under development.¹⁹
- Six million Flexible Fuel Vehicles (FFVs) are on the road today. In 2006, automakers built 800,000 more FFVs that can use up to 85% ethanol blends. FFV production numbers are expected to double by 2008.²⁰

Cooperation and Collaboration

Due, in no small part, to the 25 years of Congressional cooperation and incentives, trillions of miles have been driven on American roads with ethanol blended gasoline. The industry has grown from zero production in 1978 to the point where 46% of the nation's gasoline now contains ethanol. Ethanol blends in Iowa have reached a market penetration of 80%, while Minnesota initiated its own renewable fuel standard and has successfully blended ethanol into nearly 100% of the state's gasoline pool.

U.S. Fuel Ethanol Production 1980-2007



Source: Clean Fuels Development Coalition; US EIA Data



"We are reaching a point of absolute consensus that we need to take control of our energy future. Biofuels like ethanol are an important step down that path. This is not about Republicans or Democrats, federal government or state government, but instead it is a movement for the entire nation.

By working together we can build on the phenomenal success of the past two decades."

— U.S. Senator Ben Nelson, former Governor of Nebraska and founder of the Governors' Ethanol Coalition, September 2007

"To safeguard our future economic health as well as our national security, we must move aggressively to diversify our energy sources. Every time we visit the gas pump these days, we are reminded that there is no time to waste."

— Energy Secretary Samuel W. Bodman, July 7, 2006

"All kinds of technology can reduce our reliance on oil, but if we want to do something that's fast and effective, ethanol is the way to go."

— IL Senator Barrack Obama, February 2006

Facts For The Record:

■ Ethanol is the only proven commercial scale renewable transportation fuel currently available in the marketplace,²¹ and has the potential to replace at least 10% of the nation's gasoline supply.²²

U.S. Reliance on Imported Oil Carries a High Price

“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.”

— U.S. Department of Defense, May 1995²⁹

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.

It 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 is to become less dependent on foreign oil for security reasons, and that means alternate sources.”

— President George H. 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.”

— Senator John McCain (R-AZ)²⁸

A Clear and Present Danger

Beginning with the Eisenhower Doctrine in 1950, U.S. foreign policy has called for a strong military presence in the Middle East. The primary goal is to ensure the uninterrupted flow of oil from this most turbulent part of the world. Clearly, our fifty-year reliance on imported oil is a primary driver of U.S. military strategy. 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.”²³

The cost of maintaining this military presence is staggering, exceeding \$50 billion per year.²⁴ Depending on various assumptions in several studies, the true cost of oil, counting military and energy security expenses is somewhere between \$125 and \$150 per barrel.^{25,26}

Today, the United States imports more than 60% of its oil and, at current rates, will import 70% by 2025. Two-thirds of the world’s oil is in the Middle East, primarily in Saudi Arabia, Iran and Iraq. The United States has less than 3% of world oil reserves. The Department of Energy predicts North American oil imports from the Persian Gulf will double from 2001 to 2025.²⁷

Facts For The Record:

■ Over the last six years, the **U.S. has spent more than \$507 billion** on Middle East military costs between Iraq and the “global war on terrorism.” — Congressional Research Service, 2007

■ A recent *New York Times* editorial put the real cost of gasoline — including military expenditures — at \$5 per gallon.³³

The True Cost of Oil

Annual U.S. crude oil production today is 5 million barrels per day after peaking at 9 million barrels per day in 1969, increasing our reliance on foreign oil from 30% to nearly 70%.³⁰ Growing U.S. dependence on foreign oil is the nation's Achilles heel. The twin threats of ruinous price hikes and supply disruptions can have serious consequences for all Americans. National security concerns, economic disturbances and a continual degrading of the environment all stem from our insatiable appetite for petroleum.

According to a study by the National Defense Council Foundation, America spends nearly \$50 billion a year defending Persian Gulf oil, adding more than one dollar to the true cost of a gallon of gasoline. Total economic penalties of America's oil dependence equal \$297.2 billion to \$304.9 billion annually. If reflected at the gasoline pump, these "hidden costs" would force the pump price of gasoline to \$5.28 per gallon. A fill-up for the average vehicle would cost well over \$100.

The study further concludes the overall economic toll of this dependence on foreign oil is staggering. The diversion of capital and investment resulting from spending \$220 billion annually on foreign oil, i.e. money that could be invested in the U.S., costs the U.S. economy more than 800,000 jobs per year. Federal, state, and local government treasuries lose

\$13.4 billion in tax revenues. According to the Government Accountability Office (GAO), 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.³¹ Increasingly volatile oil prices and the U.S. military presence in Iraq no doubt raise these costs significantly and magnify the losses.

"It is increasingly clear that riches from oil trickle down to those who would do harm to America and its friends. If this situation remains unchanged, the United States will find itself sending soldiers into battle repeatedly, adding the lives of American men and women in uniform to the already high cost of oil."

—Timothy Wirth, C. Boyden Gray, John Podesta,
"The Future of Energy Policy," Foreign Affairs,
July/August 2003

"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

"We have a serious problem in the U.S. We are addicted to oil, which is often imported from unstable parts of the world."

—President George W. Bush,
2006 State of the Union Address

Facts For The Record:

■ U.S. crude oil and refined fuel product imports have more than doubled over the last 20 years. In 2006, the U.S. consumed 20 million barrels per day, while world demand was approximately 85 million barrels per day. With 300 million people, the U.S. consumed 24% of the total and China, with more than 1 billion people, ranked next and is gaining fast. China's demand for energy is expected to increase 150% over the next 15 years. That projected rate of growth is seven times greater than U.S. demand projections. China already imports more than 50% of its petroleum and will certainly compete with the U.S. and other western industrialized countries for world oil supplies in the future.³²

The True Cost of Gasoline



“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 Scientists³⁴

Environmental Costs Are Not Included in the Price of Gasoline

Along with national security and economic concerns, the environmental externality cost of our growing dependence on fossil fuels surely poses the most serious threat of all. Burning increasing amounts of petroleum-based transportation fuels is poisoning the earth’s atmosphere. Change is required. Nothing less than the continued health of each person and the planet is at stake.

According to the American Lung Association, health care costs associated with air pollution are estimated to be \$50 billion each year and growing. Ninety million Americans live in areas with dangerous levels of ozone pollution and tens of millions more live in areas not meeting all federal quality standards.

Air pollution costs from the transportation sector alone are staggering, mainly because the atmosphere enables a fast and widespread diffusion of pollutants. The U.S. Department of Energy estimates 82% of carbon monoxide emissions, 43% of reactive organic gases (precursors to ozone) and 57% of nitrogen oxides come from gasoline alone.

Facts For The Record:

- “One should remember the combined impact of wars, terrorism, and environmental degradation is likely to send the price of oil right through the ceiling over the next two decades. Alternatively, the cost of emerging technologies is likely to decrease over time, as mass production and commercialization takes place.” National Defense Council Foundation - The Hidden Cost of Imported Oil.³⁶
- If consumers paid the environmental costs of crude oil directly, prices would be \$7 to \$27 higher per barrel.³⁷
- The U.S. Commerce Department estimates that each \$1 billion of trade deficit costs the U.S. 19,100 jobs.

Ethanol, on the other hand, is a clean-burning, renewable fuel. Its expanding use is helping to reduce harmful pollutants in our air and therefore helps reduce health care costs and human mortality. Ten percent ethanol blends reduce greenhouse gases (GHG) by nearly 30%, according to the models developed by Dr. Michael Wang of the Argonne National Laboratory. The Clean Air Act Amendments of 1990 required the production and distribution of cleaner-burning gasoline, containing oxygenates such as ethanol, in America's most polluted cities. Since their introduction in 1995, these "reformulated" fuels have dramatically lowered air toxic emissions.

Beginning in 2006, with the Renewable Fuel Standard as the law of the land, greater use of ethanol fuels will mean lower levels of life-threatening toxins in our air.

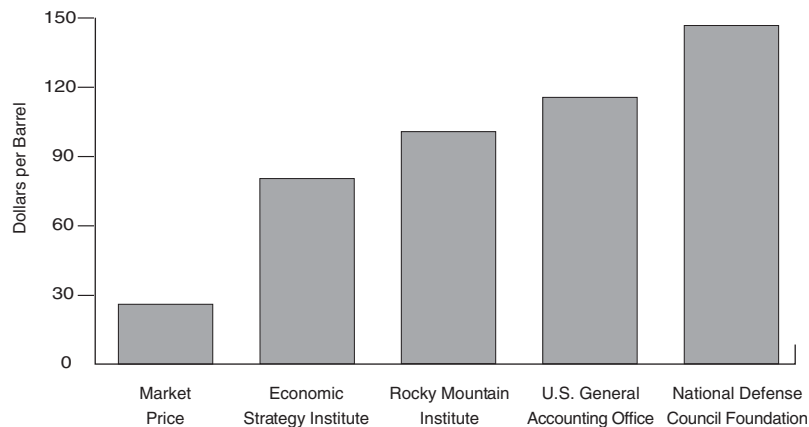
"Aromatic hydrocarbons in gasoline include benzene, toluene, and xylene. Benzene is a known carcinogen, one of the worst air toxics. 85% of all benzene in the air we breathe comes from motor vehicle exhaust. Xylene from automobile exhaust in the morning rush hour will form ozone [smog] in sunlight to 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)³⁵

"America can be the innovation engine that changes the course of history by creating crucial new clean-energy technologies, 21st century jobs, and a democratizing force that provides solutions to our greatest needs."

— Richard E. Smalley, the late scientist, visionary, and nanotechnology leader determined that the number one and most pressing challenge facing humanity was access to clean energy.

The Real Cost of Oil



"The Real Cost of Oil" estimates in these studies were based on the then current average market price of crude oil of \$30 per barrel. With 2007 market prices exceeding \$70 per barrel, the external costs originally represented in this graph could be considered much higher.

Petroleum Imports Account for a Significant Portion of America's Trade Deficit

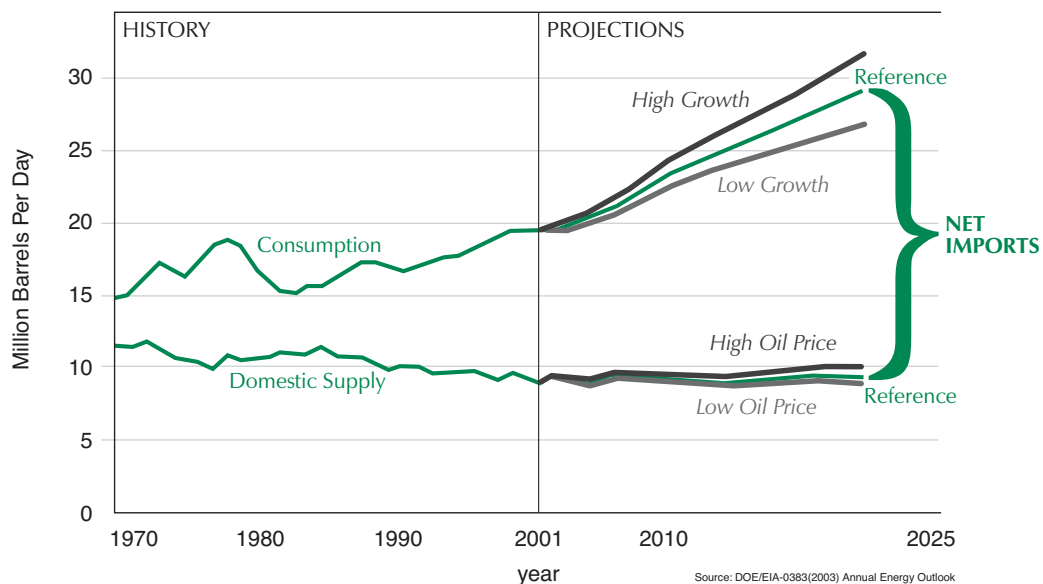
"Today, imported petroleum products account for nearly 40% of the U.S. trade deficit. Some projections suggest that number will approach 70% in the next 10 to 20 years. Based on the accelerating increases of the last few years, that day may not be far off."

— Federal Reserve Bank of San Francisco,
September 2006

Gasoline Use is Fueling our Trade Imbalance

A nation's trade balance is the value of all goods and services sold to other countries (exports) minus the value of all goods and services purchased from other countries (imports). The U.S. trade balance has run in the red since 1975 and just keeps getting redder. In 1976, the trade deficit was \$6 billion. In 2005, it was \$716 billion.³⁸ Petroleum products are the largest component of U.S. imports and accounts for 31% of the 2005 deficit. To meet demand in 2005, the U.S. imported 310 million barrels of petroleum at a cost of \$18.5 billion each month. On an annual basis, that is \$220 billion for imported petroleum products. This represents a massive transfer of U.S. wealth to foreign countries.³⁹

Petroleum Supply, Consumption and Imports 1970-2025



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.

The main driver of increased petroleum imports is continuing growth in the U.S. transportation sector. Ninety-five percent of transportation fuels are derived from petroleum, the majority of which is imported. The numbers tell the story.

- U.S. daily petroleum consumption for all sectors reached 14 million barrels in 2006. Nine million barrels per day, or 65% of total consumption, went to the transportation sector.
- There are 301 million people living in the United States and 198 million of those people are registered drivers. Registered drivers have registered 231 million vehicles.
- To propel those vehicles, drivers purchased 186.6 billion gallons of fuel (gasoline plus diesel sales) in 2005 — an annual average per car consumption of 810 gallons.⁴⁰
- Gasoline makes up the majority of passenger fuel sales—accounting for 75% of the fuel mix or 141 billion gallons of gasoline per year.
- Every day, U.S. drivers fill up 35 million times and drive 8.2 billion miles on 387 million gallons.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 (R-TN),
July 22, 2003

Facts For The Record:

- Berkshire Hathaway, Inc. chairman Warren Buffett, and George Soros, chairman of Soros Fund Management, are among investors predicting that a widening trade gap will weaken the dollar even after the U.S. currency rallied last year.⁴²
 - 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 2002.⁴³
 - Gasoline consumption has risen by more than 40 billion gallons per year since our first oil embargo.⁴⁴
-

Reducing Oil Imports is a National Priority

“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 ⁴⁵

“No single policy tool can substantially increase 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 Energy ⁴⁶

“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

Ethanol Reduces Oil Imports

According to the EPA Regulatory Impact Analysis of the Renewable Fuel Standard (RFS) Program released in April 2007, the U.S. currently consumes about 190 billion gallons of gasoline and diesel fuel annually to meet its transportation fuel needs. Of this volume, about 65% or 124 billion gallons is derived from foreign sources. The United States’ dependence on imported oil petroleum to meet its growing demand for transportation fuel exacts a cost on the nation in terms of energy security. In addition, petroleum-based fuel exacts a cost on the nation with respect to environmental quality. The RFS program improves national energy security by creating a market for renewable fuels as a substitute for petroleum-based fuels. By incorporating incentives for investing in research and development of renewable fuels, the RFS program also seeks to accelerate the nation’s progress toward energy independence.

A Barrel Saved

Ethanol provides additional and diverse fuel supplies, providing finished fuel at the end of the supply chain. 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.

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.⁴⁷

“...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

“Our national security is inextricably linked to our country’s energy security...projected climate change is a threat multiplier in already fragile regions of the world, exacerbating conditions that lead to failed states—the breeding grounds for extremism and terrorism... There is a relationship between carbon emissions and our national security... we think that the evidence is there that would suggest that we have to start paying attention...carbon emissions are clearly part of the problem...we will pay for this one way or another...we will pay to reduce greenhouse gas emissions today, and we’ll have to take an economic hit of some kind. Or, we will pay the price later in military terms. And that will involve human lives. There will be a human toll.”

— Comments of several former military leaders at the release of their study entitled “National Security and the Threat of Climate Change,” April 17, 2007, www.SecurityAndClimate.cna.org

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.” – Government Accountability Office (GAO)⁴⁸

■ “At current capacity, we are producing more than 180,000 barrels of fuel ethanol per day, which directly reduces the amount of crude oil we need to import.” – DOE/Energy Information Administration, July 2003

■ General Accounting Office concluded that ethanol and other oxygenates could displace 311,000 barrels of crude oil per day by 2010.⁴⁹

Reducing Oil Imports is a National Priority

“But in the interests of our national security, our climate, and our pocket books, we should now move together as a nation – indeed as a community of oil importer nations – to destroy, not oil of course, but oil’s strategic role in transportation as quickly and as thoroughly as possible. The national security reasons to destroy oil’s strategic role are substantial.

Over two-thirds of the world’s proven reserves of conventional oil lie in the turbulent states of the Persian Gulf, as does much of the oil’s international infrastructure. Increasing dependence on this part of the world for our transportation needs is subject to a wide range of perils. Just over a year ago, in response to bin Laden’s many calls for attack on such infrastructure, al Qaeda attacked Abcaiq, the world’s largest oil production facility, in northeastern Saudi Arabia. Had it succeeded in destroying, e.g., the sulfur-clearing towers there through which about two-thirds of Saudi crude passes – say with a simple mortar attack – it would have succeeded in driving the price of oil to over \$100 per barrel for many months, perhaps close to bin Laden’s goal of \$200 per barrel. What we need is a transportation fuel that is as secure as possible, as clean as possible and as cheap as possible. Today, oil meets none of these needs.”

— Former CIA Director James Woolsey, Member of the National Energy Commission, before the Senate Finance Committee, April 19, 2007





“A new study ordered by the Pentagon warns that the rising cost and dwindling supply of oil — the lifeblood of fighter jets, warships, and tanks — will make the U.S. military’s ability to respond to hot spots around the world ‘unsustainable in the long term.’ The costs of relying on oil to power the military are consuming an increasing share of the military’s budget. Energy costs have doubled since the terrorist attacks of Sept. 11, 2001, and the cost of conducting operations could become so expensive in the future that the military will not be able to pay for some of its new weapon systems. All four branches of the military must ‘fundamentally transform’ their assumptions about energy, including taking immediate steps toward fielding weapons systems and aircraft that run on alternative and renewable fuels.”

— Boston Globe, May 1, 2007

“The developing world will bear the brunt of the collateral damage from our historic global warming emissions, but the United States will experience its own self-inflicted wounds, including threats to our national security and military readiness.”

— Chairman Edward J. Markey, (D-MA). Chairman, Select Committee on Energy Independence and Global Warming, April 17, 2007

“The U.S. has been very blessed by the age of oil. The age of oil isn’t sustainable.”

— Retired Navy Vice Admiral Dennis McGinn, CQ, April 20, 2007

Ethanol Production Creates Jobs and Stimulates the Economy



"We have to create new jobs every 5-7 years. I would love to claim credit for the jobs created on my watch but they were started by the information technology revolution. Those jobs permeated quality jobs throughout the United States and drove the economy. Today, that same opportunity exists with expanding biofuels, solar, wind, and other renewable energy sources. We are missing a great opportunity. If I were running for office today, I would run on that issue alone and tell the American public that if you don't want renewables, you don't want me."

— Former President Bill Clinton, Center for American Progress speech, Georgetown University, 2006

More Jobs and Lower Taxes

Producing fuel ethanol in the U.S. generates jobs and wealth by processing domestic resources into clean burning transportation fuel. Thousands of jobs, increased farm income, and tax receipts in the hundreds of millions of dollars follow. As importantly, costly petroleum imports are replaced by American-made fuel.

By 2007, the U.S. ethanol production industry consisted of 115 plants operating in nineteen states. The nearly 7 billion gallons annual capacity of these plants was a whopping 38% increase over the previous year. With dozens more plants coming on line in 2008 and 2009, U.S. capacity will increase to nearly 12 billion gallons. This accelerated growth pattern has magnified the economic contributions of the industry.

Facts For The Record:

- In 1993 US ethanol production led to the creation of almost 200,000 jobs per year.⁵⁰
- A 40 million gallons per year ethanol plant will cost about \$60 million to build, expand the economic base for the local economy by \$110 million, generate an additional \$19.6 million in household income, improve the tax revenue for the state and local governments by \$1.2 million, and create nearly 700 permanent jobs.⁵¹
- USDA projected that the increased demand for corn to support the additional ethanol production needed to replace MTBE increased cash receipts from marketings for farmers by \$2.3 billion between 2000 and 2004.⁵²
- New jobs are created as a consequence of increased economic activity caused by ethanol production. The increase in gross output resulting from ongoing production of a 50 million gallon per year ethanol plant will support the creation of as many as 836 jobs in all sectors of the local economy while a 100 MGY plant will generate nearly 1,600 new jobs. – LECG, LLC, 2006

According to economist Dr. Donis Petersan, of the Nebraska Public Power District, a 100 million gallon per year ethanol plant results in:

- \$150 million in capital construction investment.
- \$70 million to the local economy during construction.
- Expansion of the local economic base by \$233 million each year.
- 45 direct jobs plus 101 indirect jobs throughout the area.
- Household incomes raised by \$7.9 million annually.
- Millions more in increased local, state, and federal tax revenues.
- Grain prices raised by 5 to 10 cents per bushel.
- Tax revenues of \$3.2 million annually.

Replacing foreign oil with ethanol stimulates virtually all major sectors of the U.S. economy. Estimates of the number of U.S. jobs already attributed to ethanol range from 95,000 to 135,000—and that number is growing rapidly as plants are built or expanded. Far beyond rural America and agriculture, ethanol influences the technology, manufacturing, transportation, and construction sectors—along with several others.

“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 savings to the consumer is approximately \$270 million per year.”

— U.S. Department of Energy

“Growth in the energy sector continues to create a variety of job opportunities for skilled tradespeople.

This is especially evident with ethanol plants.

The extensive piping, boiler, and pressure vessel work at an ethanol plant requires special skills that our members provide. The duration of these projects and the geographic diversity of the plant locations will continue to be an important part of the skilled trades work load in both urban and rural areas of many states.”

— Mark McColley, Business Manager, Steamfitters & Plumbers Local Union # 464, January 2007

“Ethanol production increases America’s global competitiveness. More U.S. made products are exported. The number of manufactured goods increases and investment in the U.S. grows.

Ultimately, we will keep jobs and increase the number of better paying American jobs.”

— Rep. Tom Osborne (R-NE)

Ethanol Saves Taxpayers and the U.S. Treasury Billions of Dollars Annually

Increase Employment and Lower the Deficit

Fuel ethanol production generates wealth and jobs with value-added processing of domestic, renewable resources into clean-burning transportation fuel. As a result, the fuel ethanol industry is a significant part of state and federal economies. Two of the largest sectors of the U.S. economy, agriculture and energy, are directly affected by ethanol production and sales. Indeed, the Government Accountability Office (GAO) reports that a 50% decline in the production of fuel ethanol would actually cost the U.S. Treasury \$3.2 billion annually. A more dramatic 90% production decline would cost the Treasury \$6.3 billion.⁵³

Further, an analysis by the U.S. Department of Agriculture concluded that eliminating the ethanol tax incentive would increase the trade deficit, lower farm income and result in lost jobs. According to Dr. Catherine Woteki, Acting Under Secretary for Research, Education and Economics, the trade deficit would have increased between \$4.5 billion and \$7.8 billion annually during the period from 1998 to 2005.

In addition, Woteki projected that farm income for American corn growers would fall between \$5.9 billion and \$10.2 billion each year. Between 56,000 and 112,000 American jobs would be lost.

A nationwide consumer analysis concluded that consumers would pay an additional \$5.4 billion per year in the absence of the ethanol tax incentive. The state-by-state analysis conducted by AUS Consultants analyzed the impact of an elimination of the ethanol tax incentive in terms of jobs, income, and gasoline prices. Specifically, the report concluded:

- Consumers would pay \$3 billion more in higher gasoline costs, including \$500 million in increased federal gas taxes;
- Household income would fall by \$2.9 billion; and
- 120,600 Americans would lose their jobs.

Facts For The Record:

- A dramatic 90% decline in ethanol production would cost the U.S. taxpayers \$6.3 billion annually. – U.S. Government Accountability Office (GAO)⁵⁴
- 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
- The combination of reduced farm program costs and increased income tax revenues results in a net gain to the U.S. Treasury of \$1.30 per gallon of ethanol produced. As a result, ethanol generates \$555 million of net tax revenue for the Federal Treasury annually through personal and business tax receipts.⁵⁵

Ethanol Provides a Return on Investment

On one side of the ledger, ethanol is stimulating the economy and creating revenue for local, state, and federal tax base. Therefore, on the other side of the ledger, losing U.S. ethanol production would cost the government and taxpayers billions of dollars in lost opportunity.



“According to our analysis, an RFS of 8 billion gallons could have a positive effect on the farm economy. While impacts vary by commodity, net farm income would increase. The construction boom in ethanol plants experienced over the last five years would continue generating rural jobs. The nation’s reliance on crude oil and gasoline imports would decline slightly and its fuel source would become more diversified. The ethanol production boom provided by the RFS would attract more financial capital into ethanol production that would improve the production and delivery infrastructure and in likelihood continue the advance in production efficiencies that are reducing ethanol’s cost of production.”

— Keith Collins, Chief Economist, U.S. Department of Agriculture; Testimony before U.S. Senate Committee on Agriculture, July 2005

“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 Fuel Standard (EPAct 2005) would...create more than 200,000 jobs nationwide and boost U.S. farm income by \$6 billion per year.”

— U.S. Senator Chuck Hagel, (R-NE) Feb. 14, 2003

Fuel Ethanol Provides Tremendous Trade Benefits

“World renowned investor Warren Buffett says he is losing faith in the soundness of U.S. currency as an investment vehicle because the U.S. is running a huge trade deficit — close to \$500 billion [in 2003], and rising rapidly — that is causing income to flow out of the country at such a rapid rate that it will soon become unsustainable. Buffett warns that the rapidly mounting U.S. trade deficit could lead to a dramatic plunge in the value of the dollar and a host of additional economic consequences that could add up to disaster for American families.”

— Forbes Magazine, November 2003 ⁵⁹

“The deficit in 2005 was 20% greater than 2004 and more than twice as large as just four years earlier. It’s going to start to snowball... we’re at a tipping point. No industrial nation has ever run a deficit this size.”

— Catherine Mann, Institute for International Economics, 2006

“With America now importing 60% of the oil we use and a national bill for this habit that came to \$250 billion last year, there is simply no time to waste. With worldwide demand growing rapidly, and with concern about the environmental impact of greenhouse gases rising, the deployment of clean, reliable sources of energy is clearly in our national interest.”

— Secretary of Energy Samuel W. Bodman

Ethanol Creates Balance

The U.S. is currently importing almost \$1 billion per day in crude oil.⁵⁶ The trade benefits from ethanol production are twofold. On one hand, ethanol production creates a number of valuable co-products for export such as distillers dried grains, corn gluten, animal feed supplements, and corn oil. On the other hand, ethanol improves the nation’s trade balance by displacing imported petroleum products, a key element of our burgeoning trade deficit.

In 2006, more than five billion gallons of ethanol were used in the United States. This resulted in a gallon-for-gallon reduction in the amount of gasoline used, and using less gasoline means importing less petroleum.⁵⁷ Given average crude oil prices of \$58 per barrel paid by U.S. refiners in 2006,⁵⁸ the use of ethanol replaced 120 billion gallons of crude oil imports and lowered the trade deficit by \$6.9 billion.



“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 Council ⁶⁰

“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

“The trade deficit for the month of May 2003—one month—was \$41 billion—a total for the entire year in 1984.”

— U.S. Department of Commerce,
Bureau of Economic Analysis press release,
Aug. 14, 2003

“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 (1996) it stood at \$188 billion, setting a new high record for the third consecutive year.”

— U.S. Senator Robert Byrd (D-WV), March 19, 1997

Facts For The Record:

- In 1997, ethanol production improved the U.S. trade balance by approximately \$2 billion.⁶¹
- Eliminating the ethanol tax exemption would increase the trade deficit by \$4.5 billion to \$7.8 billion between 1998 and 2005. – U.S. Department of Agriculture⁶²

The Federal 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

Overview

Federal government incentives to help develop certain industries are not a new idea — it’s a proven concept. By the end of World War II the government invested more than \$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.⁶⁴ This investment launched the United States as the world’s strongest industrial power. While many in the oil industry remain among the most adamant critics and oppose tax incentives for ethanol, the petroleum industry is one of the industries that have been substantially supported by the U.S. government. A study by the U.S. Government Accountability Office (GAO), found that since 1968 the oil industry received approximately \$150 billion in tax incentives.⁶⁵

Federal tax policy has served consumers and the ethanol industry well. When modern-era sales started in the 1970s, a total exemption from the federal fuel tax enabled ethanol to compete with gasoline. These early sales provided the basis for the eventual commercial viability of the industry.

In 2004, Congress passed the American Jobs Creation Act (AJCA). One provision of the law created the Volumetric Ethanol Excise Tax Credit (VEETC) that replaced the partial tax exemption system with a tax credit for each gallon of ethanol blended.

VEETC

The VEETC credit is \$0.51 per gallon of ethanol blended with gasoline. Unlike the previous exemption system, VEETC does not prescribe a certain level of blending but rather grants the credit for each gallon of ethanol blended. The credit is available to those blending “an alcohol fuel mixture” as a part of their trade or business. Fuel blenders must pay the current federal tax rate of 18.4 cents on each gallon of ethanol and gasoline in the fuel blend. VEETC can then reduce a blender’s federal motor fuel tax liability. If the amounts of VEETC credits exceed the tax liability, the difference is refunded. The credit may be taken only once for each gallon of ethanol. All ethanol, whether imported or domestically produced, is eligible. The VEETC expires on December 31, 2010.

Ethanol Blends and E85

In addition to establishing VEETC, the AJCA defined new opportunities for ethanol sales in non-taxed fuel markets. For example, U.S. cities and towns are not subject to federal excise taxes on motor fuel. Since the cities were already tax exempt, partial exemptions for ethanol blends were of little value. VEETC allows a city’s fuel supplier to receive the credit and price ethanol blends competitively with other fuels. E85, the fuel blend containing up to 85% ethanol, is more competitive with gasoline now that VEETC treats it like any other ethanol blend. This allows E85 to benefit from the credit and creates an opportunity to compete effectively in the marketplace.

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.”
— James Woolsey, former Director, Central Intelligence Agency, 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 Action⁶⁶
-

The Federal Fuel Ethanol Tax Incentive



Increased Tax Revenues to the Highway Trust Fund

New law requires the full federal motor fuel tax of 18.4 cents per gallon be collected on all ethanol sold. These tax receipts, along with those on fuel blended with ethanol, are credited to the Highway Trust Fund (HTF). Previously, ethanol blenders paid 13.2 cents per gallon on 10% ethanol blends and proportionately reduced rates on blends below 10%. As a result, the HTF received only 10.7 cents per gallon of tax revenue on ethanol blends and 2.5 cents of that amount was transferred to the federal General Fund. This revenue loss directly affected the building and maintenance of the nation's transportation systems.

In addition, states that used large amounts of ethanol were penalized by receiving fewer federal transportation funds because of the distribution formula that allocates funds based on federal tax revenues generated in a state. Now, all ethanol blends are taxed at the full rate and all receipts go directly to the Highway Trust Fund. Revenues available to the nation's transportation infrastructure increased by nearly \$3 billion annually.

Small Producers Credit

Congress passed the Small Ethanol Producer Tax Credit program in 1990 to encourage domestic ethanol production. It allows certain producers a nonrefundable federal income tax credit equal to 10 cents per gallon for the first 15 million gallons produced annually.

The American Job Creation Act changed the definition of “small ethanol producer” from those producing fewer than 30 million gallons annually to those producing fewer than 60 million gallons annually. Dozens of producers who were previously ineligible now qualify for credits because of their annual production levels. The program was extended through December 31, 2010.

The small producer credit offsets federal income tax liabilities but also becomes taxable income. The credits may be “carried back” one year and forward for up to three years. Unused credits become an income tax deduction after the “carry forward” period has expired. The American Jobs Creation Act also allows these credits to offset Alternative Minimum Tax liabilities, an option not previously available. The American Jobs Creation Act also allows cooperatives to allocate the tax credits among their member owners.

Imported Ethanol

The Renewable Fuel Standard and the reduced tax rate for ethanol blends does not distinguish between ethanol produced in the U.S. and ethanol brought in from outside the country. Imported ethanol from countries such as Brazil can help U.S. refiners meet their renewable requirements and represents attractive value-added markets for this Brazilian ethanol. Due to the fact that the value of the ethanol tax exemption is reflected in ethanol prices, imported ethanol is subject to an import duty in order to offset the U.S. tax benefits they receive.

“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

“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, 1980 ⁶³

Ethanol Helps Reduce Harmful Pollutants from the Air You Breathe

Ethanol is better than Gasoline, or Benzene, or Toluene, or Xylene, or...

When you consider the following data, ethanol has significant environmental and personal health benefits:^{67,68,69}

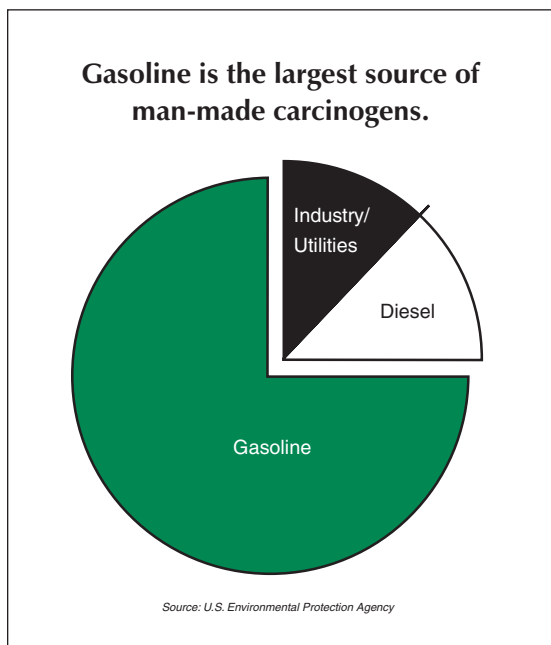
- The Environmental Protection Agency (EPA) estimated total annual cancer cases from gasoline and its combustion products in 1995 was between 250 and 600,⁷⁰ and ranked gasoline as the number one source of toxic emissions.⁷¹
- Because ethanol is inherently cleaner than gasoline, it emits less hydrocarbons, nitrogen oxides, carbon monoxide and hydrogen. As a result, it 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.
- The Environmental Protection Agency (EPA) found benzene, released in the air from burning coal and oil, gasoline service stations, and motor vehicle exhaust, to be the most likely air toxin to cause cancer. There is a 25% greater cancer risk because of benzene. The good news is that, because of motor vehicle standards, fuel composition changes, and motor vehicle inspection and maintenance programs, benzene emissions will decrease by about 60% between 1999 and 2020 (EPA).
- 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).
- Ethanol is rapidly biodegraded in surface water, groundwater and soil, and is the safest component in gasoline today. – *The Governors' Ethanol Coalition*
- Ethanol reduces tailpipe carbon monoxide emissions by as much as 30%, toxics content by 13% (mass) and 21% (potency), and tailpipe fine particulate matter (PM) emissions by 50%. – *Gary Z. Whitten, Smog Reyes, February 2004*
- Blending ethanol in gasoline dramatically reduces carbon monoxide tailpipe emissions. According to the National Research Council, carbon monoxide emissions are responsible for as much as 20% of smog formation. Additionally, ethanol-blended fuels reduce tailpipe emissions of volatile organic compounds, which readily form ozone in the atmosphere.
- The American Lung Association of Metropolitan Chicago credits ethanol-blended reformulated gasoline with reducing smog-forming emissions by 25% since 1990.

The Addition of Ethanol Improves Gasoline

The principal air quality concerns arising from gasoline powered mobile-source emissions are ozone, toxins, and carbon monoxide. Most toxic air pollutants decrease when ethanol is blended with gasoline, primarily through dilution.

“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 Association



Facts For The Record:

■ Using either E85 (85% ethanol, 15% unleaded gasoline) or E10 (10% ethanol, 90% unleaded gasoline) fuel greatly improves air quality and energy efficiency. Results show that ethanol can reduce greenhouse gas emissions up to 85%. There is also a 50% to 60% reduction in fossil energy use. — Argonne National Laboratory, December 2005

Ethanol Helps Meet National Emission Reduction Goals



“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 affects unborn babies, infants, and people with anemia or a history of heart disease.”

— American Lung Association ⁷⁴

Ethanol Reduces Greenhouse Gases and 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.

Ethanol Supports the Federal Oxy-Fuel Carbon Monoxide (CO) Reduction Program

Ethanol is required in CO control programs and, while optional in RFG, it remains a key component of clean fuel formulations in major urban areas such as the Northeast region of the United States. CO is a key contributor to ozone formation. EPA estimates transportation accounts for 66-80% of CO emissions in our nation’s cities.⁷² 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.⁷³

Facts For The Record:

■ 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.⁷⁵

Ethanol Supports the Federal Ozone and Air Toxins Reduction (Reformulated Gasoline) Programs

The federal reformulated gasoline (RFG) specification also includes a limit on benzene (a gasoline octane enhancer and a known carcinogen), as well as a ban on heavy metal additives such as lead and manganese. As a source of “clean octane,” ethanol remains a vital component of RFG, enabling refiners to meet emission requirements. 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 components. RFG is sold in 18 states and the District of Columbia since 1995 and has reduced toxic gasoline related emissions by nearly one million tons.

“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 ⁷⁵

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

Ethanol Reduces Greenhouse Gas Emissions

“By reducing the amount of foreign fuel we import through increasing the use of renewable fuels, we will prevent release of greenhouse gas emissions equivalent of up to 14 million tons of carbon dioxide.

What does that mean? It’s like preventing the greenhouse gas emissions from 6.5 million cars.”

— Steve Johnson, EPA Administrator, September 7, 2006

“The political establishment is awakening to this challenge of global warming, but there needs to be a strong, steady, insistent alarm, not a soft, soothing wakeup call. We are running out of time. . . scientists tell us we have about 10 years, or the effects of our global warming emissions may become irreversible. We all must join together to solve it. As Thomas Friedman wrote on Sunday in the New York Times, ‘green is geo-strategic, geo-economic, capitalistic and patriotic.’”

— Senator Barbara Boxer, National Press Club Speech, April 18, 2007

“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.”

— James Woolsey, former Director, Central Intelligence Agency, former Chairman of the Advisory Committee, Clean Fuels Foundation, April 3, 1998

“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.

Gasoline Contributes to Greenhouse Gases

“Gasoline and diesel consumption account for about 41% of the greenhouse gases inventory in the United States.⁷⁶ 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 Agency⁷⁷

“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

Ethanol Reduces Greenhouse Gases

In addition, the RFS program helps to reduce the country’s greenhouse gas emissions, thereby reducing the nation’s contribution to global climate change and its potential effects on the U.S. economy, security, and public health.⁷⁸

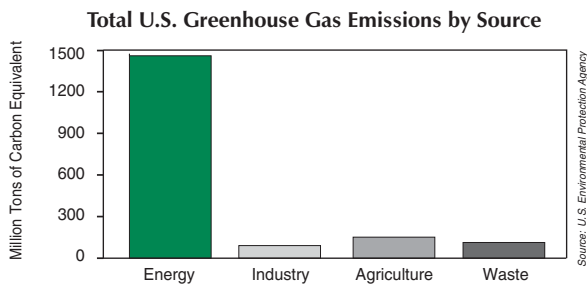
Facts For The Record:

■ The use of ethanol-blended fuels reduced carbon dioxide-equivalent greenhouse gas emissions by approximately 5.7 million tons in the United States during 2003. — Argonne National Laboratory

■ 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 E85 reduces greenhouse gas emissions more than any other alternative fuel.”

Ethanol Reduces Greenhouse Gases

The Greenhouse gases, Regulated Emissions and Energy use in Transportation (GREET) model was developed by Dr. Michael Wang at the Argonne National Laboratory's Center for Transportation Research with support from the DOE/Office of Energy Efficiency and Renewable Energy. The GREET model shows cornstarch ethanol clearly outpaces petroleum-based fuels, and that tomorrow's cellulose-based ethanol will do even better. On a per-gallon basis, GREET shows corn-based ethanol reduces GHG emissions by 29%.



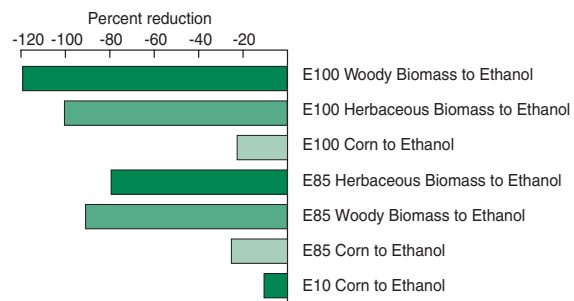
This translates to an annual per-vehicle reduction of more than four tons of carbon dioxide. If five million flexible fuel vehicles burn E85 instead of gasoline, total carbon dioxide emissions are reduced by 20 million tons per year. This reduction is equal to shutting down five 500-megawatt coal fired power plants. Ethanol produced from cellulosic materials will offer even greater benefits, with an 85% reduction in greenhouse gas emissions.

“There is no debate among any staturesd scientists of what is happening; the only debate is the rate at which it’s happening.” — Harvard University⁷⁹

“... 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

Greenhouse Gas Reductions Compared to Gasoline



Facts For The Record:

- “About 75% of the anthropogenic [man-made] emissions of carbon dioxide to the atmosphere during the past 20 years are due to fossil fuel burning.” — United Nations Intergovernmental Panel on Climate Change, January 2001⁸⁰
- Ethanol-enriched fuels reduced greenhouse gas emissions by 7.8 million tons, which is comparable to removing 118 million cars from the nation’s roads each year. — Argonne’s GREET 1.6 Model
- The use of ethanol-blended fuels reduced carbon dioxide-equivalent greenhouse gas emissions by approximately 5.7 million tons in the United States during 2003. This reduction is equivalent to removing the annual greenhouse gas emissions of more than 853,000 cars from the road. — Argonne National Laboratory

Technological Advances in Ethanol

“The way people in this country use oil is a serious threat to our security, our economy and the well-being of our planet. Al-Qaeda must revel in the irony that America is effectively helping to fund both sides of the war they caused. As we sacrifice blood and treasure, some of our gas dollars flow to the fanatics who build the bombs, hatch the plots and carry out attacks on our soldiers and citizens. The transfer of American wealth to the Middle East helps sustain the conditions on which terrorists prey.”

— Senator John McCain (R-AZ), April 23, 2007⁸²

“The lure and the illusion of low gasoline prices have lulled us into placing our economic security in jeopardy, our military forces at risk and our leadership in question.”

— Former Strategic Air Command, General Lee Butler (USAF ret.), former Chairman, Clean Fuels Foundation

“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

“There is no single panacea that will solve our energy crisis; we must rely on and encourage multiple forms of production”

— President Jimmy Carter, State of the Union Address, January 21, 1980

Ethanol is a Winner

Periods of soaring crude oil prices and tight supplies continue to periodically strike the economy. Two and three dollar per gallon gasoline is becoming the norm. When Hurricane Katrina damaged petroleum refineries on the Gulf Coast in 2005, we were reminded how tenuous crude oil supplies and refined product prices can be. Lines formed at gas stations and prices reached \$5 per gallon in some areas. Natural gas prices soared to three times historical highs and rationing in some areas was required. Tapping into the vast potential of American agriculture and the enormous biomass resources could allow the U.S. to shrug off those factors and supply clean and abundant energy.

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, according to the USDA.⁸¹ Ethanol production represented 6% of the corn crop in 2000, 14% in 2005, and USDA projected 20% for 2006 — equal to the amount of corn currently exported. This pours billions of dollars into rural economies and saves taxpayers billions of dollars – but there needs to be a balance. A sustainable 21st century must include a sustainable rural economy and producing diverse feedstocks for supplies of clean transportation—including cellulose.

Facts For The Record:

■ “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, 1996⁸³

■ “In November 2001, a barrel of oil was selling for \$18. In less than four years, the price jumped to \$70. This means that Saudi Arabia, which exports about 10 million barrels per day, receives an extra half billion dollars every day from consuming nations, and Iran, which exports 2.5 million barrels per day, an extra \$125 million.” — Anne Korin, Co-Director of Institute for the Analysis of Global Security (IAGS), March 2006

Win, Win, Win

Farmers win with increased income opportunities from new crops grown specifically for cellulose production; agricultural processors win by benefiting from increased quantities of feedstocks; 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 (e.g., switchgrass and fast-growing woody crops are highly compatible with improved wildlife habitats and land conservation); 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.

Concerned philanthropists Bill Gates (Microsoft), Richard Branson (founder and chair of the British conglomerate Virgin Group), and Vinod Khosla⁸⁴ (venture capitalist, Google, Sun Microsystems) are among a growing list of successful entrepreneurs trying to stimulate ethanol production. Branson established Virgin Fuels, which will channel \$3 billion to helping solve the climate crisis, and \$400 million into biofuels investments over the next three years.

"I think we have a replacement for oil today. It's cheaper, cleaner, it doesn't require a change of infrastructure, and it appeals to most of the lobbies. What is this platform? It's ethanol."

— Vinod Khosla, CEO, Khosla Ventures⁸⁵

"I believe cellulosic ethanol is the future of fuel, over the next 20 or 30 years, I think it actually will replace the conventional fuel that you get out of the ground."

— Richard Branson, Virgin Fuels⁸⁶

"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."

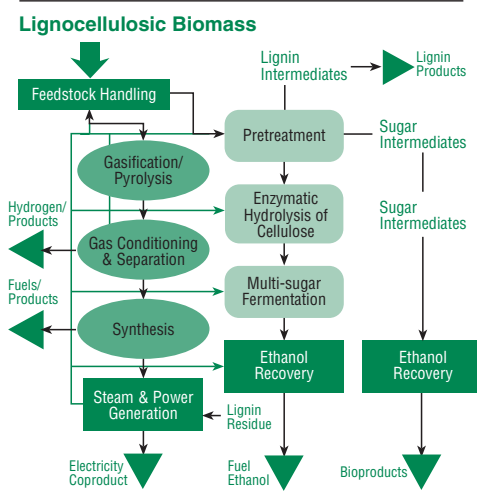
— National Renewable Energy Laboratory, The American Farm, Harnessing the Sun to Fuel the World, March 1994

"We can look forward to the day when a ton of biomass will be traded like a barrel of oil is today."

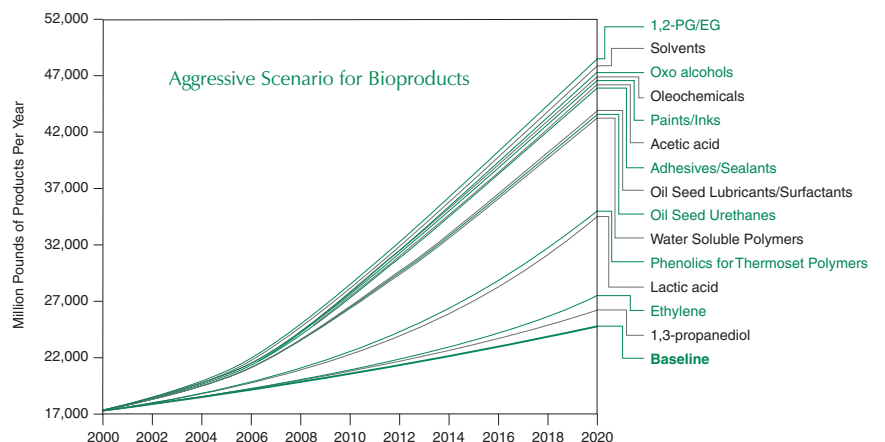
— Energy Secretary Bill Richardson, October 1998

Cellulosic Biorefinery Vision

- An integrated biorefinery makes use of:
- Thermochemical conversion technology
 - Biochemical conversion technology
 - Existing technology



Potential Growth of Bioproducts



Source: "Aggressive Growth in the Use of Bio-derived Energy and Products in the United States by 2010," Final Report, Arthur, D. Little., DOE contract number GS-23F-8003H, October 31, 2001

Diverse Ethanol Feedstocks

“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

“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

“Six biorefinery projects over the next four years, when fully operational, are expected to produce more than 130 million gallons of cellulosic ethanol per year. This production will help make cellulosic ethanol cost-competitive with gasoline by 2012.”

— Samuel W. Bodman, Secretary, DOE, February 8, 2007, announcing DOE’s \$385 million cellulosic ethanol loan guarantee program.

“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

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

— World Bank⁹³

Delivering On the Promise of Cellulose Conversion

There is no better time than the present to aggressively invest in expanding the U.S. ethanol program by developing cellulose conversion technologies. Today, ethanol can be produced from grains (e.g., corn, wheat, sorghum, etc.) or “cellulose.” The definition of cellulose in the Energy Policy Act of 2005 includes dedicated energy crops and trees; wood and wood residues; plants; grasses; agricultural residues; fibers; animal wastes and other waste materials; and municipal solid waste. Forestland and agricultural land, the two largest potential biomass sources, can yield more than 1.3 billion dry tons per year of biomass potential. This is enough feedstock to produce biofuels to meet more than one-third of the current demand for transportation fuels – about 60 billion gallons per year (BGPY) (e.g., 140 BGPY gasoline and 25 BGPY diesel x .33 = 54.45 BGPY).⁸⁷

Cellulose can be converted into ethanol via enzymatic (i.e., sugar/enzymatic/microorganisms) or thermochemical (i.e., heat or gasification processes). Ethanol produced in conventional corn/grain-based plants and ethanol produced from cellulosic sources are the same product, but are made with different feedstocks and different processes. As a result, today it costs more to produce cellulose-based ethanol versus corn or grain-based ethanol – but progress is being made.

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 average person generates 4.5 pounds of trash per day.” David Stienter, CEO, Waste Management Inc.
- A “Well to Wheel” (WTW) life cycle analysis model was used to calculate greenhouse gas emissions produced by fuels in internal combustion engines. “The WTW model for cellulosic ethanol showed greenhouse gas emission reductions of about 80% (over gasoline).”— Argonne National Laboratories

Fuel Ethanol Has Enormous Potential: The Brazilian Example

Corn and cellulose processes are designed to extract fermentable sugars from biomass materials and then ferment them into ethanol. DOE recently provided loan guarantees to six companies to help prove technological developments, improving yields, and driving down cellulose-based ethanol production costs.⁸⁸ There are also dozens of private companies investing millions of dollars to move cellulose based ethanol production from the lab to the market. There is a growing consensus on the steps needed for cellulosic ethanol from biomass to succeed in the market place. The National Resources Defense Council said it believes increased spending on research and development in conversion and processing technologies, funding for demonstration projects, and joint investment or other incentives to spur commercialization are pathways to success.

Every administration and every Congress is criticized by the public for their 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 the government to develop such alternatives. While any petroleum displacement program must begin with goals, the programs must put teeth into those goals.

Brazil is a shining example of how a commitment by government can help achieve 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 a valuable success.⁸⁹

“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.” — United States Department of Energy⁹²

Brazilian Ethanol Program Highlights⁹⁰

- Ethanol accounts for 40% of Brazilian automobile fuel
- Flexible fuel vehicles account for 67% of new car production
- Annual production is in the range of four billion gallons
- Brazil adds at least 20% ethanol to all gasoline sold in Brazil
- E100 (pure ethanol) is sold at 92% of the 32,030 service stations
- Since the 1970s, ethanol has replaced about 800 million barrels of oil, the equivalent of almost two years of current Brazilian oil production
- Ethanol production has created an estimated one million direct jobs⁹¹
- Ethanol saved Brazil \$43.5 billion U.S. dollars between 1976 and 2000
- The elimination of lead and the introduction of ethanol, as both a gasoline additive and fuel, led to a dramatic fall in carbon emissions, approximately 90% by 1995
- Brazil's ethanol industry generates at least 3.7 units of energy for each unit required in production, and possibly up to 10.2 units
- Brazil is the largest exporter of ethanol. In 2004, the country exported to India, the U.S., South Korea, Japan, and members of the European Union among others

Applied Science

“The most economical and practical use of ethanol is as a 10% blend in gasoline. It requires no modification to the vehicle, no major changes to the service station pumps or storage tanks, and has a long history of successful use by consumers.”

— Red Caveney, President,
American Petroleum Institute ⁹⁴

“We’ll take all the ethanol that corn growers produce. We’ll use that enthusiastically as a 10% blend with gasoline.”

— Peter J. Robertson, Vice Chairman, Chevron ⁹⁵

“One factor behind lower prices in Dallas and Houston (Texas) is the wider availability there of ethanol-based fuel, which is cheaper than regular gasoline.”

— Lynton Allred, Texas Association of Independent Gasoline Marketers

“The transition to ethanol has been seamless. Virtually every one of our terminals is capable of receiving ethanol, by rail or barge... receiving tank loads 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

Ethanol is a Strategic and Flexible Fuel

Not all alternative fuels are created equal. A domestic, renewable, clean, liquid fuel that is compatible with existing vehicles and can be used in the existing refueling infrastructure without changes would be a truly strategic commodity, considering the nation’s ongoing oil import predicament. That statement defines ethanol. It is argued that one of the reasons many alternative fuels have struggled to make a significant dent in the transportation fuel pool is due to the enormous cost and task of changing refueling infrastructure. For example, hydrogen, natural gas, compressed natural gas (CNG), electricity, and other alternative fuels require special handling and equipment and are confined to specially-made vehicles that can only operate on one fuel.

While ethanol has its opponents in the oil industry, ethanol is unique among alternative fuels because of its diversity and success in application. When 10% ethanol is blended with gasoline, no changes to refueling systems or vehicles are required. Ethanol blends up to 85% can be used in more than 6 million flexible fuel vehicles currently on the road with new models widely available to the public at no additional cost. With these many applications, ethanol is indeed the most “strategic and flexible” of all the alternatives and, more importantly, the most successful.

Although the chemical makeup of ethanol exhibits an affinity for water and thus may limit its ability to be transported in pipelines, many oil companies attest to the fact that ethanol presents no particularly unique problems. 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. The transition, therefore, to large quantities of ethanol is achieved with much greater ease than any of the other alternative fuels.

The Evolution of a Revolution

Historically, many petroleum refiners have been reluctant to embrace ethanol for obvious market share and competitive reasons. Others fully support ethanol and dismiss claims that it presents their industry with unique problems. 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 fuels. The flexibility of fuel from these domestic and renewable resources can provide liquid “biofuels” for internal combustion engines, electric and hybrid vehicles, and fuel cell vehicles.



“Big Oil has reacted aggressively against the expansion of ethanol production, suggesting that it perceives the growth of biofuels as an independent, competitive threat to its market power in refining and gasoline marketing...consumers have a large stake in the outcome of the war being waged by Big Oil against ethanol... supporting increased competition in the automobile fuels market will help discipline a market dominated by a handful of multinational oil companies that are extracting monopoly profits from US gasoline consumers.”

— *Big Oil v. Ethanol*, Consumer Federation of America, July 2007

“Switching to diesel fuel and using hybrid cars make limited but worthwhile contributions. ‘Plug in hybrids’ may increase this – awareness about this option has really emerged only since this analysis was completed. Fuel cells may become material towards the end of the period. But the major early contribution – and the largest over the 50 year time frame as a whole – comes from biofuels.”⁹⁶

— Philip New, Vice President, Global Biofuels, BP

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.

Deployed Research

Driving Down the Road to Energy Independence

There are 198 million registered drivers with 231 million vehicles in the United States. They purchase 185 billion gallons of fuel at 170,000 refueling stations, and are reliant on gasoline/petroleum for 97% of their fuel—and nearly 70% of that fuel is imported from unstable regions of the world. The nation has a long way to go, but it is crossing the bridge from oil dependence to energy independence.

The nation's precarious energy predicament has fueled a long-time debate: Build the alternative fuel cars first or the infrastructure to support them. The argument is over — U.S. automakers have delivered the chicken that can lay the golden economic eggs — flexible fuel vehicles (FFVs). U.S. automakers have produced over 6 million flexible fuel vehicles and have more than 200 vehicles that get 30+ miles to the gallon. U.S. FFV makers have also committed to increasing their FFV capacity to 50% of production if the E85 refueling infrastructure is in place.

There needs to be a concerted and equal commitment from industry and government ethanol stakeholders to increase the investment into more public E85 refueling infrastructure. According to the National Ethanol Vehicle Coalition's on-line E85 refueling database (www.e85fuel.com), there are more than 1,200 E85 stations already established in the United States.

The Road Ahead: A Fork

Peak oil production occurred in the U.S. in 1969. Discovered oil reserves outside of OPEC and the former Soviet Union peaked in 1997.⁹⁸ Many believe the rest of the world reached peak oil in 2005. Steady high world oil prices are proving those prognosticators right.⁹⁹ By mid-century, the world's vehicle population is expected to reach 2 billion, almost triple the current level.¹⁰⁰ A report by the Paris-based International Energy Agency says world energy demand is expected to surge by up to 60% by the year 2030. By the year 2030, world demand for oil will hover around 121 million barrels per day, compared to current demand of about 82 million barrels per day. China today imports about 30% of its oil needs. In 2030 this will be more than double.¹⁰¹

The Renewable Fuel Standard (RFS), a provision of the Energy Security Act of 2005, went into effect on January 1, 2006, and immediately ensured that America's use of clean-burning renewable fuels would double by 2012. Among several provisions in the law that directly affect the ethanol industry, the RFS requires specific volumes of renewable fuel to be in gasoline sold in the U.S. starting with 4 billion gallons per year in 2006 and ending with 7.5 billion gallons in 2012. For the first time in history, ethanol producers have a guaranteed baseline market. That was the good news.

Facts For The Record:

- U.S. automakers predict they will sell 8 million flexible fuel vehicles by 2008. If all of these vehicles run on E85, U.S. gasoline consumption would be reduced by 4.5 billion gallons per year. – Chrysler Group
- One out of every 10 jobs in the U.S. is dependent on the automotive industry. No other industry is linked to so much U.S. manufacturing or generates more retail business and employment.⁹⁷

In 2006, however, the U.S. blended over 5 billion gallons of ethanol, racing past the initial 2006 RFS requirement of 4 billion gallons. In fact, the 2012 requirement of 7.5 billion gallons will be surpassed five years ahead of schedule in 2007. Early projections show 2008 production capacity will likely exceed 11 billion gallons. In light of these facts, the RFS serves more as a safety net for ethanol producers—in effect, guaranteeing a market for two-thirds of the country's production capacity.

Because the industry has already surpassed the mileposts prescribed in the RFS, there is growing interest in raising the target market numbers to provide the type of encouragement to the industry contemplated when Congress first debated the RFS in 2003 and 2004. Debates to expand and enhance the RFS have already started in the 110th Congress.

“The RFS is good for our nation’s energy security; we’re also doing what’s good for our farming communities. Doubling the amount of renewable fuels produced from American crops means a lot more soybeans, sunflower seeds and corn, as well as other material like cellulosic biomass and restaurant grease, will be turned into fuel.”

— Stephen Johnson, EPA Administrator,
September 2006

Facts For The Record:

- The U.S. Environmental Protection Agency estimates that, by 2012, the RFS will:
 - Reduce petroleum consumption by 3.9 billion gallons per year,
 - Reduce carbon monoxide levels by 3.6%,
 - Reduce benzene emissions 6.2%, and
 - Reduce greenhouse gas emissions by 14 million tons per year.

The Nation Needs a New Renewable Fuel Standard

“One of the biggest energy policy questions facing us is how to diversify energy supplies for transportation ... the United States faces significant energy security challenges stemming from our dependence on foreign oil. Biologically-derived fuels will have an important role to play in promoting our energy security.”

— U.S. Senator Jeff Bingaman, (D-NM) Chairman,
Senate Energy Committee, March 27, 2007

“The time has come for clean burning biofuels like ethanol to join the mainstream. By doing so, we will reduce our dependence on foreign oil and secure our nation’s energy future. I look forward to quickly moving this legislation through the Energy Committee and bringing it to the floor.”

— U.S. Senator Pete Domenici, (R-NM)
Ranking Member, Senate Energy Committee,
March 27, 2007.

Conclusion

The Renewable Fuel Standard (RFS) has been without question the most effective policy tool ever devised to spur ethanol production. While the tax incentive for the petroleum industry to market ethanol blends is extremely important, it never drove the market the way the RFS has. Meeting the RFS requirements four full years ahead of the schedule established in the Energy Policy Act of 2005 underscores the effectiveness of this initiative. A new and expanded Renewable Fuel Standard will only bring more of the many benefits we have already seen. The current proposals in Congress and introduced by the Administration would position renewable fuels to displace 20 percent of our current petroleum usage—no small amount given the size of the motor fuel pool. Through the RFS, there can be no denying that we have found the right combination of incentives and initiatives as we hope this *Ethanol Fact Book* has helped illustrate.

The Convenient Truth: Frequently Asked Questions

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 blended with gasoline to extend fuel supplies at volume levels of 5.7, 7.7, or 10%. These fuel formulations are approved by all automakers and the EPA. Ethanol is also used to increase octane and improve the emissions quality of gasoline as required by the Clean Air Act Amendments of 1990 in carbon monoxide and ozone nonattainment areas. Ethanol is also used as an alternative fuel to meet Clean Air Act and Energy Policy Act crude oil displacement goals. In this application, 85% ethanol and 15% gasoline is blended to be used in flexible fuel vehicles. In the future, ethanol can be used as a fuel to power fuel cells, airplanes and other energy applications.

Will ethanol perform well in my vehicle and is it covered under my warranty? **YES!**

All automobile manufacturers approve the use of ethanol/gasoline blends up to 10%. Approval of ethanol blends is found in the owner's manual under references to refueling or gasoline. General Motors Corporation states in its owner's manual they recommend the use of fuel oxygenates, such as ethanol, when and where available. Fuel ethanol blends are sold in nearly every state and can be found in 46% of the nation's gasoline.¹⁰² Ethanol-blended gasoline has achieved nearly 100% market share 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 more than 95% of the state's gasoline. Therefore, fuel ethanol is successfully used in all types of vehicles and engines that require gasoline.

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. Since ethanol burns 100% and leaves no residue, it cannot contribute to the formation of deposits. Ethanol blends actually keep fuel injectors cleaner — helping improve engine performance. Ethanol 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 years ago. 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. The IndyCar Series® converted to using 100% ethanol beginning in 2007.

The Convenient Truth: Performance, Food vs. Fuel

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 using 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.

With the incredible growth in ethanol production, will we run out of corn? **NO!**

In 2006, U.S. corn farmers produced a near record 10.74 billion bushels of corn. Of that, 1.8 billion bushels went to the production of ethanol and co-products—so there is plenty of room to expand ethanol production without limiting the availability of corn. Average corn yields continue to increase and other nations are growing more corn as well, so the supply continues to grow. At the same time, new raw materials for ethanol production are being developed including cornstalks, switch grass, vegetable matter, waste from paper/pulp production, and other “cellulosic” sources.

Are we going to have to choose between food and fuel? **NO!**

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.¹⁰³ Co-products from the milling of corn have important nutritional properties that add value to feed rations and livestock feeding programs.¹⁰⁴ 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.¹⁰⁵ The corn used to make ethanol is field corn, which is primarily fed to livestock, not humans—so ethanol production does not have a dramatic impact on the amount of corn eaten by people. Additionally, ethanol facilities also make distillers grains and gluten feed—products that are fed to livestock, producing high quality meat and dairy products for the U.S. and abroad. Wet mill ethanol facilities (also called “corn refineries”) produce food ingredients such as cornstarch, corn sweeteners and corn oil—all products that add to the food supply for humans. Bottom line: We can have both food and fuel—and more of both, thanks to ethanol production.

The Convenient Truth: Prices and Energy Balance

Does ethanol increase gas prices? **NO!**

Historically, ethanol prices have correlated with the price of gasoline and other fuel blending components—and ethanol blends typically cost less at the pump. During 2006, many petroleum marketers phased out MTBE (an oxygenate that has been banned in many states) more rapidly than anticipated—creating a huge and sudden demand for ethanol in new markets such as Texas. This action temporarily raised the price of ethanol on the commodity market (due in great part to distribution challenges which caught railroads and trucking companies by surprise)—and, at times, ethanol blends were priced higher at the pump as a result. Ethanol production capacity across the nation is ramping up at an amazing rate. It is expected that ethanol prices will continue to moderate as availability and distribution improve—and ethanol blends will resume their price position at or below that of ordinary unleaded gasoline.

How much does ethanol cost compared to gasoline?

The lower tax rate for ethanol-blended gasoline makes ethanol less expensive than gasoline for gasoline wholesalers. Gasoline wholesalers increase the retail price of ethanol due to ethanol's high quality and value as an octane enhancer. The cost of producing ethanol is generally higher when compared to the production of gasoline because crude oil prices in the Middle East can be as low as \$3-\$5 per barrel and can be sustained at levels of \$10 per barrel. The majority of ethanol's production costs are the result of the cost of the feedstock (i.e., grain) paid to U.S. farmers. The average cost of producing ethanol ranges from \$1.10 to \$1.50 per gallon. The \$0.51 per gallon federal ethanol excise tax exemption provides the price differential between the wholesale price of gasoline and the traditionally higher cost of producing ethanol.

Do we get more energy out of ethanol production than it takes to produce ethanol? **YES!**

But let's first set the benchmark — Gasoline has an energy ratio of 0.805. In other words, for every unit of energy dedicated to the production of gasoline there is a 19.5% energy loss.¹⁰⁶ Dozens of studies have proven that ethanol is a net energy winner — creating more energy than it takes to produce. Moreover, these studies take into account the energy required to grow, harvest and transport the corn to the ethanol plant. Corn ethanol is energy efficient, as indicated by an energy ratio of 1.34; that is, for every Btu dedicated to producing ethanol, there is a 34% energy gain.¹⁰⁷ According to the U.S. Department of Agriculture, producing ethanol from domestic corn stocks achieves a net gain in a more diverse form of energy. Ethanol production also 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 1.100.¹⁰⁸

Since 1995, nine independent studies have found that ethanol has a positive net energy balance—including conclusive studies conducted by the University of Nebraska and other educational institutions. In June 2004, the U.S. Department of Agriculture found that ethanol production results in 1.67 times more energy. In 2002, a similar study found the ratio to be 1.35 to 1 — proving that ethanol production has become more efficient.¹⁰⁹ If farmers and industry were to use all the best technologies and practices, the net energy ratio would be 2.21 to 1.99.¹¹⁰ Farmers are also using less energy to produce their corn crops and crop yields continue to increase annually which further improves the ratio.

It's also important to realize that the energy used in ethanol production results in more products than just ethanol. Co-products such as distillers grains, carbon dioxide and corn sweeteners are produced—further reducing the amount of energy devoted solely to ethanol production.

The Convenient Truth: Greenhouse Gases, Water Use, and More Information

Does ethanol really help reduce greenhouse gas emissions? **YES!**

The greatest contributor to greenhouse gas emissions is transportation fuel—the exhaust from the millions of cars, trucks, and other vehicles on America’s highways. The Argonne National Laboratory has found that using ethanol in gasoline produces 32% fewer emissions of greenhouse gases than gasoline for the same distance traveled. Ethanol also reduces emissions of other harmful pollutants such as carbon monoxide—and it dilutes and displaces toxic gasoline components such as benzene and toluene.

How much water is used in ethanol production?

The amount of water used in ethanol production has declined dramatically as ethanol production has become more efficient. Today, it takes about 3.5 gallons of water to produce one gallon of ethanol—and much of that is processed and returned to streams and watersheds. At one time, it took 8 gallons of water to produce one gallon of ethanol, so the industry is continually getting better at conserving this precious resource. To put this in perspective, a 100 million gallon per year ethanol plant uses about as much water as it takes to irrigate about 1,000 residential lawns of 5,000 square feet each during a typical spring-summer season.

Online Resources

The Ethanol Fact Book is a broad source of reference-based information on a wide range of different issues. For more specific information on ethanol and the policies and programs that drive its use, please review the Clean Fuels Development Coalition's web site at www.CleanFuelsDC.org, or browse the multitude of other credible online resources for information on ethanol provided on the next two pages.

Legislation (Contacts, Bills, Hearings, Committees)

The White House	www.whitehouse.gov
United States House of Representatives	www.house.gov
United States House of Representatives Law Library.....	uscode.house.gov
United States Senate	www.senate.gov
Thomas (Legislation Information)	www.thomas.loc.gov

Government Research

Alternative Fuels Data Center	www.afdc.nrel.gov
Department of Agriculture, Office of Energy Policy and New Uses.....	www.usda.gov/agency/oce/energy
Department of Agriculture, Office of Rural Development	www.rurdev.usda.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	www.oil.bpo.gov/bpo-oil.html
Brookhaven National Laboratory	www.suntid.bnl.gov
Clean Cities	www.ccitites.doe.gov
Energy Efficiency & Renewable Energy Network.....	www.eren.doe.gov
Federal Register	www.ssd.c.ucsd.edu/gpo/fedfld.html
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	www.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
Environmental Protection Agency	www.epa.gov
Office of Transportation and Air Quality	www.epa.gov/otag
General Accounting Office.....	www.gao.gov
Government Printing Office	www.access.gpo.gov
Internal Revenue Service	www.irsustreas.gov
Library of Congress	www.loc.gov
Office of Technology Assessment	www.ota.gov

Ethanol/Energy/Environmental and National Security Related Organizations

Consensus for a larger and sustainable ethanol industry is alive in Washington, DC, and it also lives in towns and organizations all across America. The success of ethanol can be widely attributed to the thousands of people who have dedicated their time and resources to advance energy, environmental, economic, and national security through the advancement of enhanced national energy and environmental policy.

Ethanol/Energy/Environmental and National Security Related Organizations

Clean Fuels Development Coalition	www.cleanfuelsdc.org
Ethanol Across America	www.ethanolacrossamerica.net
American Coalition for Ethanol	www.ethanol.org
Citizen Action	www.essential.org/CMEP
Clean Air Network	www.naturalgas.com
CONEG Policy Research Center Inc.	www.coneg.org
Energy Future Coalition	www.EnergyFutureCoalition.org
Environmental Education on the Internet	www.nceet.snre.umich
Ethanol Promotion and Information Council	www.drivingethanol.org
Ethanol Producers and Consumers	www.ethanolmt.org
Global Climate Coalition	www.worldcorp.com
Governors' Ethanol Coalition	www.ethanol-gec.org
Intergovernmental Panel on Climate Change	www.ipcc.ch
Interstate Oil and Gas Compact Commission	www.iogcc.oklaosf.state.ok.us
National Commission on Energy Policy	www.NationalCommissiononEnergyPolicy.org
National Conference of State Legislatures.....	www.ncsl.org
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.neiwpsc.org
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
Renewable Fuels Association	www.EthanolRFA.org
Set America Free	www.SetAmericaFree.org
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
United Nations Foundation	www.unfoundation.org
USA CityLink	www.usacitylink.com//default.html
Government Web Servers	www.eit.com/web
25 x 25 Campaign	www.25x25.org

About our Sponsors

CHARTER SPONSORS

Agri-Energy Funding Solutions

Agri-Energy Funding Solutions (AEFS) is a market finance consulting company for renewable fuel projects both nationally and internationally. AEFS' main focus is market consulting and acting as a liaison in arranging funding for renewable fuel projects. AEFS has aligned itself with renewable fuel technology providers, project consulting companies, engineers, other service providers as well as lenders and/or private equity investors and funds who have a proven track record in financing renewable fuel projects. For more information contact:

Donna Retherford, President • 402-895-5067 • agri_energy@yahoo.com
15329 W Street • Omaha, NE 68137 • www.agri-energyfs.com

American Coalition for Ethanol

The American Coalition for Ethanol (ACE) is the grassroots voice of the U.S. ethanol industry. ACE 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:

Brian Jennings • 605-334-3381 • bjennings@ethanol.org
2500 S. Minnesota Avenue, Suite 200 • Sioux Falls, SD 57105 • www.ethanol.org

Arkenol

Arkenol is a worldwide leader in the development and licensing of commercial bio-chemical technologies. Arkenol licenses its patented Concentrated Acid Hydrolysis to technology companies in need of the pure sugar stream that is produced from converting cellulosic feedstocks. The pure sugar stream can be converted into end-products such as Ethanol, Bio-Butanol, Bio-Solvents and precursor chemicals for biodegradable plastics. For more information contact:

Arnold R. Klann • 949-588-3767 x 301 • arklann@arkenol.com
31 Musick • Irvine, CA 92618 • www.Arkenol.com

BlueFire Ethanol Fuels, Inc.

BlueFire Ethanol Fuels, Inc. was established to deploy the proven Arkenol Process Technology ("Technology") for the profitable conversion of cellulosic waste materials to ethanol. BlueFire is the exclusive North America licensee of the Technology for use in the production of ethanol for the transportation fuel market. BlueFire's goal is to develop and operate high-value carbohydrate-based transportation fuel production facilities to provide a viable alternative to fossil fuels on a world-wide basis. These "biorefineries" will convert widely available, inexpensive, organic materials such as agricultural residues, high-content biomass crops, wood residues, and cellulose in municipal solid wastes into ethanol. For more information contact:

Rigel Z. Stone, Dir. of Corporate Communications • 949-588-3767 • rstone@bluefireethanol.com
31 Musick • Irvine, CA 92618 • www.BlueFireEthanol.com

Chief Ethanol Fuels, Inc.

Chief Ethanol Fuels is the 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:

Duane Kristensen • 402-463-6885 • Duane.kristensen@chiefind.com
4225 E. South Street • Hastings, NE 68901 • www.chiefethanol.com

Chrysler

Environmental Consciousness. Our concern for the environment has led to a number of firsts in green technology. Like being the first manufacturer to introduce the electric minivan, the first U.S. manufacturer to introduce CFC-free vehicles and the first car maker to sell one million Flex Fuel Vehicles(8). And for 2008, we expect to put another 500,000 Flex Fuel Vehicles on the road. We also offer the country's cleanest burning diesel with the available legendary 6.7L CumminsR featuring ultra-clean emissions technology, in a full-size pickup. Then there is the 5.7L HEMI V8 engine with MDS fuel-saving technology, and even a 5.7L HEMI V8 hybrid engine coming in 2009. For more information contact:

Deborah Morrissett, Vice President for Regulatory Affairs, Chrysler LLC • www.chrysler.com

Clean Fuels Foundation

The Clean Fuels Foundation was established in 1996 as the first charitable 501 c 3 organization dedicated specifically to educating the public about the need to develop alternative transportation fuels. The Clean Fuels Foundation has created and implemented several national education and awareness campaigns that include the Environmental Inaugural Ball, the Ethanol Across America program and Radio Show, and developed and distributed a multitude of publications. The effort is focused on educating key influential stakeholders about the benefits of reducing imported crude oil imports and replacing gasoline with clean burning renewable fuels. For more information contact:

Burl Haigwood • 301-718-0077 • burl.haigwood@cleanfuelsdc.org

Delta-T Corporation

Investing in Delta-T technology buys you the most advanced biorefinery business on planet Earth. Two decades of Delta-T design innovations have been proven at over 130 ethanol and alcohol projects on five continents. Delta-T partnered with a major water purification company to develop a unique recycling system that allowed ethanol plants to operate with zero process wastewater. Our mixed feedstock designs balance risk – expanding growing seasons and managing commodity marketing. Our unconventional thinking combines the lowest energy and water use with the smallest environmental footprint. Our newest plant design promises to cut energy use down a third and process water in half while expanding cash revenues by adding high-margin products. Delta-T technology speaks the international language of profit for the investor and protection for our world. At our technology campus we nurture the new ideas that will be tomorrow's change drivers. We team with a strong, high-trust network of partners internationally who share our vision of a renewable planet, one biorefinery at a time. For more information contact:

133 Waller Mill Road • Williamsburg, VA 23185 • 757-941-0188
sales@deltacorp.com • www.deltacorp.com

Delta-T Technology Campus

323 Alexander Lee Parkway • Williamsburg, Virginia 23185 • 757-220-2955
hightech@deltacorp.com

Delta-T Europe

Localita' Ribrocca s.n. • 15057 Tortona (AL) • +39 0131 8101
sales@deltacorp.com • www.deltateurope.com

E3 BioFuels

E3 BioFuels operates and manages the world's first closed-loop ethanol plant, fueled largely by biogas from cattle manure instead of fossil fuels. This plant is the next generation of ethanol and is in production today in Mead, Nebraska. This plant represents an enormous advancement in energy efficiency. Within the plant itself, the closed-loop system can produce over 46 units of energy for each unit of fossil fuel energy required. This compares to a conventional ethanol plant where the energy efficiency ratio is less than 3:1. E3 BioFuels' patented system consists of a cattle feedlot, an ethanol plant, and a waste management facility. The energy is produced by combining the manure with thin stillage, a cellulosic by-product of ethanol refining. The biogas is then used to distill the corn into ethanol. One by-product of the ethanol plant is wet cake, which is fed back to the cattle, completing the loop. This closed-loop system not only reduces pollution by using biogas instead of fossil fuels, it serves as a powerful waste management system for dealing with agricultural waste, including manure runoff and methane emissions, which contribute to greenhouse gas. Construction of the plant was completed in the spring of 2007. It will produce 25 million gallons of ethanol per year and consume 300,000 tons of manure. For more information contact:

Nathan Dayani • 913-441-1800 • ndayani@e3biofuels.com
5425 Martindale Suite 100 • Shawnee, KS • www.e3biofuels.com

ED&F Man Biofuels Inc.

ED&F Man Biofuels Inc is a subsidiary of ED&F Man Holdings Limited a UK based employee owned international agricultural commodity trading firm. Established in 1783 the company is involved in trading, processing and distribution of sugar, coffee, molasses, cocoa, edible oils, liquid animal feed and also tank terminaling operations. Man Biofuels markets fuel ethanol globally and in the US from its own ethanol processing plants in Jamaica and Idaho. The company is also actively investing in production of biodiesel in the US and EU. For more information contact:

Anthony R. Watts • 504-636-4301 • tony@westway.com
365 Canal Street, Suite 2900 • New Orleans, LA 70130 • www.edfmanbiofuels.com

EPIC

The Ethanol Promotion and Information Council (EPIC) is a nonprofit alliance of ethanol industry leaders who have come together to grow consumer demand for ethanol energy through targeted marketing. Our goal is to reach consumers and key influencers across the country and educate them on the performance and environmental benefits of using an ethanol-enriched fuel in their automobiles. Our vision is to establish and grow ethanol's place in the global renewable energy market. For more information about EPIC and its projects, please contact:

Tom Slunicka, Executive Director • 402-932-0567

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 80 ethanol plants nationwide from grass roots construction through expansions. With the addition of Fagen Engineering LLC, Fagen offers total plant services. Fagen, Inc. has the experience and a 3,000 person workforce that can 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:

Ron Fagen, President & C.E.O, Steve Core, Vice President, or Nick Bowdish, Project Developer
320-564-3324 • dfagen@fageninc.com
P.O. Box 159 • 501 West Highway 212 • Granite Falls, MN 56241 • www.fageninc.com

About our Sponsors

Ford Motor Company

At Ford Motor Company, we recognize that tremendous opportunities exist for innovation and development of renewable fuels. We are a leader in developing flexible fuel vehicles designed to run on E85, placing more than 2 million FFVs on America's roads. We have pledged to make half of the vehicles we produce capable of running on alternative fuels by 2012, provided the necessary fuel and infrastructure are in place. In addition, Ford and its fuel provider partners are working together to increase the number of stations offering E85, providing distribution and retail infrastructure to ensure attractive E85 pricing. As the market for renewable fuels grows, new farm policies for land use, bio-engineering initiatives to increase yields, and more efficient production techniques will all contribute to expansion of E85. In our market-driven economies, price signals and demand will encourage this innovation and growth.

For more information contact:

Curt Magleby • 313-337-6180 • cmagleb1@ford.com.
One American Road • Dearborn, MI 48126-2701 • www.ford.com

General Motors Corporation

General Motors offers 14 FlexFuel models, more than any other automaker, which can run on E85 or gasoline or any combination of the two. And GM has more than 2 million FlexFuel vehicles on the road right now. Provided the fueling infrastructure supports it, GM has pledged to make up to 50 percent of our production FlexFuel by 2012. If all manufacturers matched the pledge made by the domestic manufacturers, and the fueling infrastructure grows sufficiently, within 10 years the U.S. could displace 37 billion gallons of gasoline annually. Ethanol is the right answer for these reasons: It's renewable. It is grown and processed at home, supporting U.S. farmers and rural communities. It reduces greenhouse gases. And the technology is available right now. The United States needs to reduce its dependence on oil. At GM, we're convinced that biofuels are the best near-term alternative to oil and that ethanol is the biofuel most likely to substantially reduce our country's demand for oil. For more information contact:

Mary Beth Stanek • 313-665-1373 • mary.b.stanek@gm.com
Coleman Jones • 586-492-3738 • coleman.jones@gm.com • www.gm.com

ICM, Inc.

ICM, Inc., is focused on sustaining agriculture through innovation by engineering, building, and supporting the industry's leading ethanol plants. Featured in more than 2/3 of the ethanol biorefineries built in North America in 2006, ICM's dependable process technology allows the company to back their plants with the most aggressive yield, energy, and emissions guarantees in the industry. ICM also manufactures the industry's most efficient distiller's grain dryers, covered by a 1-year parts and labor warranty. As an industry leader, ICM's progressive expansion into R&D efforts, and domestic and international business development illustrates its commitment of exploring ways to globally promote the benefits of ethanol.

For more information contact:

Greg Krissek • 316-796-0900 • gkrissek@icminc.com
310 North First Street • Colwich, KS 678030 • www.icminc.com

John Deere & Company

Incorporated in 1868, John Deere has grown from a one-man blacksmith shop into a corporation that today does business around the world and employs approximately 47,000 people. It is one of the oldest industrial companies in the United States. The company continues to be guided, as it has been since its beginning, by the core values exhibited by its founder: integrity, quality, commitment and innovation. From the growth of feedstocks used to generate biofuels to the ever-increasing productivity and efficiency of its production practices, the agriculture industry has made an important contribution toward our national goal of increased energy independence. The contribution is certain to increase in the decades to come. For more information on John Deere and biofuels please see their "Agriculture, bio-fuels and striving for greater energy independence" white paper at www.deere.com (search ethanol) or contact:

Don Borgman, John Deere Director, Agricultural Industry Relations, North America.
913-310-8100 • BorgmanDonaldE@JohnDeere.com
11145 Thompson Ave. • Lenexa, KS 66219

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 International, Inc. 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:

Robert E. Eickelberger • 513-351-7500 • eickelberger@katzen.com, projects@katzen.com
2300 Wall Street, Suite K • Cincinnati, OH 45212-2789 • www.KATZEN.com

Nebraska Ethanol Board

Established in 1971, the Ethanol Board assists ethanol producers with programs and strategies for marketing ethanol and related co-products. The Board supports organizations and policies that advocate the increased use of ethanol fuels and administers public information, education and ethanol research projects. The Board also assists companies and organizations in the development of ethanol production facilities in Nebraska. For more information contact:

Todd Sneller, Administrator • 402-471-2941 • P.O. Box 94922 • Lincoln, NE 68509-4922
billy.defrain@ethanol.ne.gov • www.ne-ethanol.org

POET

POET, the largest dry mill ethanol producer in the United States, is an established leader in the bio-refining industry. Formerly known as Broin, POET is a fully-integrated biofuels company, orchestrating the development, design, engineering, construction and management of ethanol production facilities and then marketing the products. There are 20 POET Biorefining production facilities in five states producing and marketing over one billion gallons of ethanol annually. When seven additional plants under construction or in development start production, annual capacity will exceed 1.5 billion gallons. In addition to ethanol, POET has perfected the leading brand of premium dried distillers grains (DDGS) on the market, Dakota Gold. The 20 POET Biorefining facilities annually produce more than 3 million tons of DDGS that are sold all over the world. POET is also leading the way in the next chapter of biofuels by jointly funding the design and construction of a commercial cellululosic ethanol production facility with the U.S. Department of Energy. For more information contact:

Nathan Schock, Public Relations Director • 605-965-6428 • nathan.schock@poetenergy.com.
4615 N. Lewis Ave. • Sioux Falls, SD 57104 • www.poetenergy.com

Standard Ethanol

Standard Ethanol is an ethanol production company located in North Platte, Nebraska.

For more information contact:

Tonya van Rooyen • 308-532-8298 • tonya@mabe-ethanol.com
P.O. Box 1655 • North Platte, NE 69103

United States Department of Agriculture, Office of Energy Policy and New Uses

The Office of Energy Policy and New Uses was established in 1998. The office provides policy advice for the Office of the Secretary on energy matters, coordinates energy-related activities within the Department, serves as liaison with other Departments on energy issues, and conducts a program on the economic feasibility on new uses of agricultural products. For more information regarding ethanol contact:

Dr. Roger Conway, Director • 202-401-0461 • rconway@oce.usda.gov
Dr. Hosein Shapouri, Agricultural Economist • 202-401-0531 • hshapouri@oce.usda.gov
Office of Energy Policy and New Uses, Office of the Chief Economist, USDA
1400 Independence Av. SW • Washington DC 20250 • www.usda.gov/oce/energy

United States Department of Energy

DOE's Office of Energy Efficiency and Renewable Energy's Biomass Program works with industry, academia and our national laboratory partners on a balanced portfolio of research in biomass feedstocks and conversion technologies. Through research, development, and demonstration efforts geared at the development of integrated biorefineries, the Biomass Program is helping transform the nation's renewable and abundant biomass resources into cost competitive, high performance biofuels, bioproducts, and biopower. The Biomass Program website contains enormous amounts of information on ethanol tailored to suit the individual research needs that vary from industry to students and has links to many other research related sites. You can learn more about the EERE Biomass Program at www1.eere.energy.gov/biomass

U.S. Environmental Protection Agency – SmartWay Grow & Go Program

SmartWay is the US EPA's flagship program to promote cleaner, more efficient transportation options, which will reduce greenhouse gas emissions and air pollution. The SmartWay Grow & Go component aims to promote the environmental benefits of renewable fuels. The program will support the administration's goal of reducing U.S. dependency on foreign oil and help improve our environment. By working with our current and prospective SmartWay partners, the SmartWay Grow & Go program aims to promote the environmental benefits of renewable fuels. By 2012, EPA's goal is for 25 percent of our SmartWay partners to commit to use renewable fuels, and by 2020 to have 50 percent of our partners commit to use renewable fuels. For more information contact:

Kristin Kenausis • 734-214-4767 • smartway_transport@epa.gov
1200 Pennsylvania Ave, NW (6406J) • Washington, DC 20460 • www.epa.gov/smartway

SUPPORTING COMPANIES AND ORGANIZATIONS

Advanced BioEnergy, LLC

Advanced BioEnergy currently operates two ethanol production facilities in South Dakota, has one facility under expansion, and is completing a greenfield facility in Fairmont, Nebraska. The Aberdeen facility currently produces 9MGY and has a 40MGY ICM expansion underway with an expected completion date in December of 2007. Huron, SD currently produces 30MGY and an additional 30MGY expansion is expected to begin in late 2007. The company has a 100 MMGY facility under construction in Fairmont, NE that is on budget and on schedule to start in September of 2007. ABE's development sites are located in Argos, IN (110 MMGY) and Northfield, MN (100 MMGY), and the company has identified an additional development site in the eastern corn belt (110 MMGY). The company's executive offices are located in Minneapolis, MN. We are in the growth stage of our company's life cycle and as such we have a responsibility to our unit holders to grow smart and grow responsibly. All of our projects are considered by our executive management to be among the best of financially viable endeavors. As such, we do due diligence in the form of extensive research and feasibility studies on each site. For more information contact:

Revis Stephenson • 763-226-2701 • bsmales@advancedbioenergy.com
10201 Wayzata Boulevard, Suite 250 • Minneapolis, MN 55035 • www.advancedbioenergy.com

Alliance of Automobile Manufacturers

The Alliance of Automobile Manufacturers is a trade association including BMW Group, DaimlerChrysler, Ford Motor Company, General Motors, Mazda, Mitsubishi Motors, Porsche, Toyota and Volkswagen. Automakers have invested billions of dollars developing diverse autos that run on alternative fuels like clean diesel, biodiesel, ethanol, hydrogen, and compressed natural gas (CNG), or that run on hybrid technology. There are already 11 million automobiles that are capable of running on alternative fuels on America's roads today. These vehicles are in every state. Alternative fuel autos and the alternative fuel supplies needed to power them must be developed in harmony. Automakers support an energy policy that helps ensure diverse energy supplies are available for alternative fuel automobiles on sale today and in the future. Automakers continue to urge consumers to consider purchasing alternative fuel autos, and automakers are working with consumer groups and government in communicating that these autos are on sale today. For more information contact:

Charles Territo • 202-326-5500 • cterrito@autoalliance.org
1401 I St., NW Suite 900 • www.autoalliance.org

Andrews Kurth LLP

Since the beginning of the renewable energy industries in the early 1970's, Andrews Kurth lawyers have represented developers, lenders, constructors, engineers and other companies in the development, finance, construction, operation and maintenance of ethanol manufacturing facilities. We also work with marketers, blenders and related companies marketing ethanol and related bi-products produced from these ethanol facilities. We further have worked with clients in merger and acquisition activities related to the consolidation of companies and assets within the fuel ethanol industry. Our representation of these clients has included tax and corporate structuring of project operations, capital markets and other debt and equity finance structuring, advice on all energy, regulatory and emissions-related compliance matters and intellectual property protections. We have dealt with virtually every domestic and international legal issue faced by renewable fuels producers and related companies over these four decades. For more information contact:

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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:

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Ferm Solutions, Inc.

Ferm Solutions is a leading research, engineering, product development and technical services provider committed to the fuel ethanol industry. High quality fermentation products, such as yeast and antimicrobials, are supported by experienced industry-leading scientists with amazing fermentation technical capabilities. We provide problem solving directly at the facility or linked to on site labs for real time solutions and minimal downtime. Ferm Solutions has a highly trained staff of Ph.D. -level researchers performing research on a variety of different fermentation-based topics ranging from development of new antimicrobial technologies and products to using unique fungal species to degrade cellulosic biomass for ethanol production. In addition to in-house researchers we have established a network of collaborative research with major academic and industrial institutions. For more information contact:

Shane Baker • 859-402-8707 • sbaker@ferm-solutions.com
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A Danisco Division, Genencor is amongst the largest developers and manufacturers of industrial enzymes and the second largest biotechnology company in the world. Genencor is a leading industrial biotechnology company that develops and markets innovative enzymes and bio-based products. Genencor discovers, develops, manufactures, and delivers eco-friendly, efficient enzyme product solutions for the agri processing, cleaning and textiles, food and feed, consumer, and industrial markets. We also develop innovative advancements for the biofuels, biodefense, and biosafety industries. As a Catalyst of the Biobased Economy, Genencor is committed to contributing to a sustainable industrial system that relies on renewable resources to produce effective, environmentally friendly products. Our focus on research and development and sustainability is making this happen by driving the application of biotechnology into new areas. For more information contact:

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Governors' Ethanol Coalition

In September 1991, Nebraska's governor asked other governors interested in creating a group devoted to the promotion and increased use of ethanol to join him in Lincoln, Nebraska. From that meeting, the Governors' Ethanol Coalition emerged. Membership in the Coalition doubled from nine to 19 states during the first year. Membership as of January 2007 stands at 36 states plus international representatives from Brazil, Canada, Mexico, Queensland, Australia, Sweden and Thailand. "It is the Coalition's goal to increase the use of ethanol based fuels, to decrease the nation's dependence on imported energy resources, improve the environment and stimulate the national economy. This will be accomplished through a coordinated set of activities designed to educate and demonstrate to the public the benefits of ethanol use; to encourage ethanol fuel production and use through research and market development efforts; and to make investments in infrastructure to support expansion of the ethanol market." For more information contact:

Todd Sneller, Nebraska Ethanol Board • 402-471-2941 • todd.sneller@ethanol.ne.gov
301 Centennial Mall South, 4th Floor • Lincoln, NE 68509-4922 • www.ethanol-gec.org

Husker Ag LLC

Husker Ag LLC is a name plate 20 million gallons per year plant producing at over 28 million gallons per year. The plant is a Fagen Plant. The company is currently constructing a 40 million gallons per year ICM self perform plant located directly adjacent to the existing 20 million gallons per year plant. The expansion is set to come online in November of 2007.

For more information contact:

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54048 Highway 20 • Plainview, NE 68769 • www.huskerag.com

KAAPA Ethanol, LLC

KAAPA Ethanol is Nebraska's largest farmer-owned ethanol plant. The company began production in late 2003 at the rate of 40 million gallons per year. After completing an expansion in 2006 the company now operates at an annual capacity of 59 million gallons. KAAPA is focused on becoming a premier provider of consistently reliable, high performing products from renewable resources. KAAPA is committed to supporting farmers, growers and the environment through advancing agricultural innovation from a strong financial foundation and productive partnerships. For more information contact:

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P.O. Box 238 • 8450 KAAPA Lane • Minden, NE 68959 • www.kaapaethanol.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 • 785-448-6922 • jwhite@ksgrains.com
110 W 4th Street • Garnett, KS 66032 • www.ksgrains.com/corn

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Kansas Grain Sorghum Producers Association

The Kansas Grain Sorghum Producers Association 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 a substantial amount 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:

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Maryland Grain Producers Utilization Board

The Maryland Grain Producers Utilization Board (MGPUB) 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. MGPUB 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 MGPUB. For more information contact:

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Maryland Grain Producers Utilization Board (MGPUB)
53 Slama Road, Edgewater, MD 21037 • 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:

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National Farmers Union

National Farmers Union (NFU) was founded in 1902. NFU 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. NFU 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:

Tom Buis, President • Katy Ziegler, Director of Government Relations
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NFU (Denver) • 11900 East Cornell Ave., Aurora, CO 80014-3194 • 303-337-5500
1-800-347-1961 • www.nfu.org

Nebraska Corn Board

The mission of the Nebraska Corn Board is to develop, carry out and participate in programs of research, education, market development and promotion to enhance profitability (viability) and expand the demand and value of Nebraska corn and value added corn products. Our vision: Nebraska Corn is the first choice for a consistent supply of quality corn that is fed, processed and consumed by an expanding base of Nebraska, domestic and global customers. For more information contact:

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Nebraska Public Power District

Nebraska Public Power District (NPPD) is Nebraska's largest electric utility, with a chartered territory including all or parts of 91 of Nebraska's 93 counties. NPPD is committed to the growth and economic development of rural Nebraska. NPPD works to provide economic development assistance to value-added agriculture including the ethanol production industry and its suppliers. Nebraska offers significant cost and other competitive advantages, including industrial electric rates nearly 42% below the national average. NPPD's experienced Economic Development Team offers information about Nebraska's plant location advantages as well as information on communities and available industrial sites and buildings at www.sites.nppd.com. For more information contact:

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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:

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Novozymes North America, Inc. (reg. no.: 13-2639630) • P.O. BOX 576 • 77 Perry Chapel Church Road
Franklinton, NC 27525, United States • 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, President • 620-275-7541 • P.O. Box 1036 • Garden City, KS 67846

Renova Energy

Renova is a well established fuel grade ethanol production, marketing and distribution business which is currently focused on the Rocky Mountain Region of the U.S. Renova occupies a niche position in the Rocky Mountain Region and neighboring states of the U.S. for the supply and distribution of ethanol. There are no other production facilities in its target market and the nearest facility is some 200 miles to the east of Renova's production facility and up to 1,000 miles from Renova's target market. The Group's well established marketing and distribution infrastructure offers significant growth prospects in the Rocky Mountain Region of the U.S. For more information contact:

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913 South Latah Street • Boise, Idaho 83705 • www.renova-energy.com

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Stoel Rives enjoys a 100-year tradition of excellence as a leading U.S. law firm. With more than 365 lawyers practicing across the full spectrum of corporate law and business litigation, and offices in six states, we provide legal services to clients with local, regional, national and international operations. Stoel Rives' client base includes public and private utilities, financial institutions, software companies, developers, newspapers, hospitals, universities, charitable foundations, forest products companies, retailers and manufacturers, among others. The firm represents businesses at all stages of growth, from start-ups to internationally known public companies. For more information contact:

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VeraSun Energy Corporation

VeraSun Energy Corporation (NYSE: VSE), headquartered in Brookings, South Dakota, is committed to be a leading producer of renewable fuel. The Company has three operating ethanol production facilities located in Aurora, SD, Fort Dodge, IA, and Charles City, IA, with three facilities under construction in Hartley, IA, Welcome, MN and Reynolds, IN. VeraSun is in the process of acquiring another three biorefineries currently under construction in Albion, NE, Bloomingburg, OH and Linden, IN. Upon completion of the new facilities and those being acquired, VeraSun will have an annual production capacity of approximately one billion gallons by the end of 2008. The Company also has plans to extract oil from dried distillers grains, a co-product of the ethanol process, for use in biodiesel production. The Company markets E85, a blend of 85 percent ethanol and 15 percent gasoline for use in Flexible Fuel Vehicles (FFVs), directly to fuel retailers under the brand VE85TM. VE85TM, the first-ever branded E85, is now available at more than 90 retail locations. For more information contact:

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<http://www.verasun.com> • <http://www.VE85.com>

Vogelbusch USA Inc.

Vogelbusch USA is the premier supplier of process engineering packages for the fuel ethanol industry. For more information contact:

Gunter Brodl • 713-461-7374 • office@vbusa.com
1810 Snake River Road • Katy, TX 77449-7747 • www.vogelbusch.com

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- ¹¹⁰ "How Much Energy Does it Take to Make a Gallon of Ethanol?" Institute for Local Self-Reliance. December 1992

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About the *Ethanol Fact Book*

The *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 the expansion of the nation's Renewable Fuel Standard (RFS). 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. When contemplating the merits of fuel ethanol, please consider the subject in its entirety, as provided in this book. Our goal is to provide you with context and perspectives to consider as you sort through various claims about ethanol in the media. We hope you find this information useful and informative. We also hope it helps increase your use of ethanol by selecting ethanol blends at the pump and considering a flexible fuel vehicle as your next vehicle purchase.

We extend a special thanks to our Chairman Todd Sneller, Editor Burl Haigwood, and our long time publishing partner David and Associates for their dedication and commitment to getting this project into print.

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 email us at 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 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, CFDC has become a respected source of information for state, local and federal policy makers as well as private industry on a range of transportation, energy, and environmental issues.





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