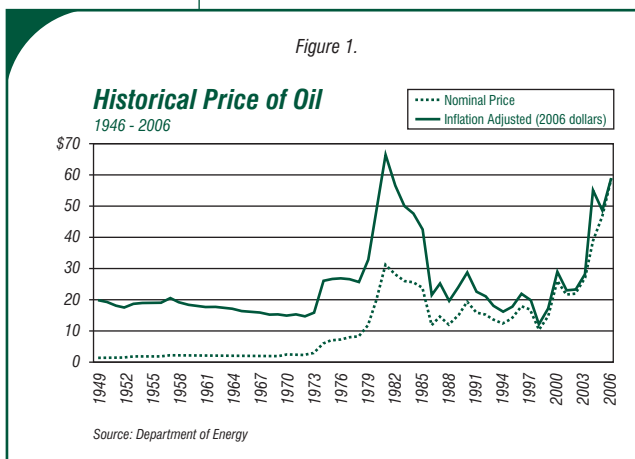


## POLICY UPDATE: A CASE FOR ETHANOL

Ethanol is all the rage. Notwithstanding volatility in the fuel's popularity, including producers' share prices, enthusiasm for ethanol amongst both investors and lawmakers continues to surge. We won't be so bold as to say that ethanol is the answer to America's energy problems or that any bet on ethanol is a sure win. But we do believe that the forces which have thrust ethanol to the forefront of the renewable fuels discussion will be with us for some time to come. An examination of those forces is the subject of this update.

### Introduction

Sometime early in this decade the concept of an energy crisis began sweeping the nation again. Perhaps the new focus on energy was to be expected after emerging from a long period of low energy prices. (See Figure 1.) And, surely, America's concerns over a stable energy supply have been antagonized by increasing volatility and violence in the Middle East and elsewhere. The 9/11 attacks, war in Iraq and Afghanistan, and fighting in Nigeria all contribute to the notion that our expectation of reliable, cheap energy is being undermined.



A wave of resource nationalism is also on the rise. In Venezuela, the government of Hugo Chavez has wrested control of petroleum resources from foreign developers. Russia has done similarly, forcing oil giants like Shell and BP to reduce their stakes in Russian projects. Climate change is an increasingly important factor. Whether one accepts the science that portends a warming planet or not, there is increasing pressure to develop petroleum alternatives. And, finally, we find ourselves competing with emerging China and India for limited, global energy reserves. The rise and rapid growth of these two developing economies (not to mention other smaller ones) has put substantial new pressures on the petroleum supply chain.

How will and how should America respond? The reactions seem to be as many and as diversified as the causes. One dynamic is certain though. The US Congress continues to propose legislation intended to ensure the nation's energy security and independence. We won't say that the government will be successful, or even that their policies are sensible. But with prices at the pump over \$3 per gallon in much of the country, Congress feels it has little choice but to do something.

Over the last several years the Congress has introduced dozens, if not hundreds, of bills intended to change the landscape of the energy industry. The object is to create incentives that will engender a reliable and affordable domestic energy supply. These incentives have resulted in substantial investment in new energy projects. While some have focused on more cheaply attaining traditional energy sources like oil and gas, the limelight has been on renewable fuels and their future prospects. Wind, solar, and geothermal sources have all received new investment. But nothing has attracted as much attention as biofuels, especially ethanol.

***Background: Trends & Blends***

Long before the current fright over energy supplies, ethanol was a component of the energy economy. It has long been recognized as a combustible fuel. In fact, some of the earliest automobiles in the United States were designed to run on ethanol until petroleum was discovered as a cheaper alternative. Even now, ethanol is still recognized for its beneficial properties in helping to combust gasoline more cleanly. Today ethanol is being manufactured at an unprecedented rate that is not abating. (See Figure 2.) Forces contributing to this continued momentum are here to stay, at least for the time being.

***Blends***

Currently most ethanol is used in gasoline blends. The most common mix, called E10, is 10% ethanol and 90% gasoline. The fuel blend is widely available around the US. In areas where auto emissions have reached harmful levels, E10 or similar blends are mandated because the fuel burns cleaner than gasoline.

E85 fuel mix (85% ethanol) can only be combusted in a flex-fuel vehicle (FFV) and isn't compatible with most of the US auto fleet. However, FFVs are capable of using both gasoline and E85. The Energy Information Administration (EIA) projects sales of such vehicles to reach 2 million units per year by 2030, or roughly 10% of total vehicle sales.

***Ethanol Beneficiaries***

At first blush it may seem that the way to profit from the surge in ethanol interest is to invest in ethanol manufacturing firms. Archer Daniels Midland (ADM) with over 20% of US ethanol production has been a beneficiary of investment since the sector first began attracting renewed attention. Subsequently, numerous pure play ethanol producers have appeared. But the implications of a continuing investment in ethanol are that a host of peripheral players will emerge as beneficiaries as well. (See Figure 3.)

Ethanol mill manufacturers such as Fagen Engineering will find themselves with more and more business. Companies with expertise in the fuel's transport like Aventine and VeraSun will find increased demand for their services. FFV auto manufacturers and their parts suppliers may feed a budding market. Biotech firms who specialize in expediting the ethanol production process can expect developing interest in their research products. And, finally, companies who are able to produce ethanol more efficiently, and with fewer detrimental effects to the environment will also benefit. Some closed-loop, integrated companies like Bion Environmental Technologies (BNET) and E3 BioFuels are beginning to exploit this opportunity.

In short, the quest for cheaper ethanol, produced cleaner and faster than its early forms will continue to propel interest and investment in this burgeoning industry. Furthermore, as newer and better solutions emerge, we can expect a proliferation of new specialty segments serving the ethanol space and all representing new ways to invest. This trend should persist, but only as long as compelling incentives are provided by a key player: the US government.

## ***Ethanol and Politics***

### *Blenders' Credit*

Biofuels in general, and ethanol in particular, have received strong support in the US Congress over the years. Ethanol received its most important legislative boost in the Energy Tax Act of 1978. The act provided a blender's tax credit of \$0.40 per gallon of ethanol. That amount has fluctuated over the years and is currently \$0.51 per gallon. The Blender's Credit is received by the petroleum industry as an incentive to blend ethanol into its gasoline. The \$0.51 equates to a credit of 5.1 cents per gallon of E10 gasoline. The Blender's Credit is significant. Without it (not to mention increasingly stringent environmental laws) the petroleum industry would be much less inclined to blend ethanol into its gasoline. Oil firms do benefit from the higher octane fuel at lower price levels.

Shortly after passing the blender's credit, Congress also enacted a \$0.54 per gallon import tariff. The tariff was meant, in part, to raise revenues that would offset the subsidy paid to domestic manufacturers. But clearly, it was also meant to protect the domestic ethanol industry. Instituted in 1980, the tariff is applied to all imported ethanol. However, it was primarily meant to target Brazilian imports. The tariff still stands and is highly effective, notwithstanding increasing Brazilian imports through the Caribbean Basin Initiative.

### *Political Expediency*

Twenty-nine years later we still find ourselves subsidizing ethanol. Some contend that we still need the incentive to stimulate a young industry, while others believe that it's simply more prudent to buy domestically than from Brazil. But one important fact should not be overlooked: the link between ethanol and the American presidential cycle.

American ethanol is produced predominantly from corn. And the nation's largest corn producer is Iowa. The first primary contest in next year's presidential election is also in Iowa - the Iowa Caucus. Candidates hoping to generate the momentum, and hence the funding, needed to gain traction and continue the presidential race must make a good showing in Iowa. As such, attempting to revoke the ethanol tax credit is akin to political suicide, at least as far as presidential aspirations are concerned.

Case in point came earlier this year. On June 20th, Senator Judd Greg (R-NH) offered an amendment to the Senate's energy bill proposing repeal of the \$0.54 tariff. The senator reasoned that if our goal is truly to lower gas prices and encourage use of alternative fuels, then we should be importing those cheaper alternatives. The amendment failed 36-56.

Quite the contrary, recent political momentum has worked to fortify the corn growers and promote further ethanol capacity. Over the last several years, the energy crisis and concerns over global warming have made it even more politically expedient to support ethanol. Many bills have been introduced which would support the industry in one way or another. (See Figure 4.) The most significant of these was the Energy Policy Act of 2005 (EPAAct).

*The Energy Policy Act of 2005*

The EPAAct was a mammoth bill representing the culmination of over 10 years of effort. The act established the first-ever renewable fuel standard (RFS) in federal law. The mandate, which is currently in effect, requires the use of 7.5 billion gallons of biofuels per year by 2012. (The RFS also includes a separate element calling for annual production of at least 250 million gallons of cellulosic ethanol starting in 2013.) A number of states have their own RFS as well (See Figure 5.)

EPAAct does not require that every gallon of gasoline or diesel fuel be blended with renewable fuels. Refiners are free to use renewable fuels, such as ethanol and biodiesel, in geographic regions and fuel formulations that make the most sense, as long as they meet the overall standard. Conventional gasoline and diesel can be blended with renewables without any change to the petroleum components, although fuels used in areas with air quality problems are likely to require adjustments. The law has the additional provision that gas stations distributing E85 may qualify for a \$30,000 tax credit.

*This year's RFS*

The centerpiece of this year's energy policy is a bill that is pending in the House of Representatives. It already passed in the Senate on June 21st. The bill is an attempt by the Democratic majority to make good on promises issued early this year to mitigate America's energy problems. It has a strong focus on renewable fuels, a major component of which is an expansion of the RFS. The new RFS proposals have support from both Democrats and Republicans and stand a good chance of being passed.

The new measure, as passed by the Senate last month, mandates the use of 36 billion gallons of biofuels per year by 2022. The current statute calls for 7.5 billion gallons annually by 2012. If the Senate bill becomes law, then beginning in 2016, an increasing amount of the mandate must be met with advanced biofuels, such as cellulosic ethanol. After 2023, the President would determine the mandate for each calendar year. In addition to direct promotion of biofuels, the Senate bill also endorses renewable fuels infrastructure to facilitate biofuels transport.

*2007 Farm Bill*

The Bush Administration has requested more than \$1.6 billion in funding for renewable energy in the 2007 Farm Bill. The request includes \$500 million for bioenergy research and another \$500 million for small renewable energy projects. Under the President's proposal \$210 million would be used to support an estimated \$2.1 billion in loan guarantees for cellulosic ethanol.

*Loan Guarantees*

The House bill would provide up to \$2 billion in loan guarantee authority for biorefinery construction. Half the amount would be allocated to loans of less than \$100 million; the other half would be reserved for loans up to \$250 million. The measure would provide loan guarantees up to 90% for loans toward the development, retrofitting and construction of biorefinery and biofuel production facilities. The measure would provide \$1.5 billion for the Bioenergy Program, which provides production incentives for increases in ethanol and biodiesel production. The increases would have to come from agriculture, forestry crops, and associated waste materials. The legislation would also establish a program promoting the production of advanced biofuels such as cellulosic ethanol. The program will focus on making advanced biofuels more cost-effective and commercially viable.

### *Other Proposals*

While the House has not yet passed a bill to increase the RFS this year, it is considering several proposals with language that would implement or extend ethanol tax credits and expand renewable fuels mandates. The Biofuels Security Act (BSA) would require ethanol biodiesel production of 30 billion gallons per year by 2020. The target would increase to 60 billion gallons per year by 2030. The measure would also oblige major oil companies to install or make available at least one E85 fuel pump at a fixed percentage of their owned and branded gas stations in each state. The BSA is one of several measures in the House that boosts the renewable fuels mandate. Other measures would expand the Strategic Petroleum Reserve (SPR) to include alternative fuels such as ethanol and oblige automakers to produce a certain number of flex-fuel-capable vehicles per year.

### *Legislative Outlook*

Even the best laid plans of most congresses often do not get passed. Passing legislation is a long, convoluted process and the likelihood of any individual bill becoming law is usually not high when it's introduced. However, there is something to the concept of momentum in politics and, at the moment, renewable fuels has it in spades. Our feeling is that the RFS has a good chance of being increased this year. Unlike legislation which is much more controversial (e.g., like climate control and carbon regulations), the RFS is popular and enjoys broad support in both parties.

### ***The Future of Ethanol***

Considering the political climate and the amount of investment capital already committed to ethanol production, we have no doubt that ethanol will be with us for a while. An important issue for producers, however, will be whether their business models protect them from a potential ethanol glut. This is a question which, for the most part, must be answered on a company-by-company basis.

One emerging model is particularly interesting however: closed-loop ethanol plants. Companies falling into this space, such as Panda Ethanol Inc. (PDAE), Bion Environmental Technologies, Inc. (BNET), and E3 BioFuels are attempting to produce ethanol economically, while also performing an environmental good. To boot, the model has the support of a number of lawmakers and would benefit from numerous bills before Congress.

Each of these companies has a business model based on combining ethanol plants with livestock operations. Ethanol boilers are powered using renewable energy generated from the livestock waste stream, and yield corn co-products that can be fed to the animals. Having the livestock and the ethanol plant in close proximity saves money on drying and transporting the co-products. Ethanol is produced without fossil fuel inputs, and distillers grains can be fed directly without being processed or transported.

The result is a “closed loop” process that produces fuel economically and may also qualify for multiple tax benefits. The model is self-contained and can be implemented in many potential locations if adequate waste management technology is utilized to mitigate environmental impacts from hazardous pollutants. If future ethanol profits become the province of the low-cost provider, these innovators may have a compelling advantage. And, what we can say with confidence is that an era of mandated ethanol demand is here to stay for the foreseeable future.

Figure 2.

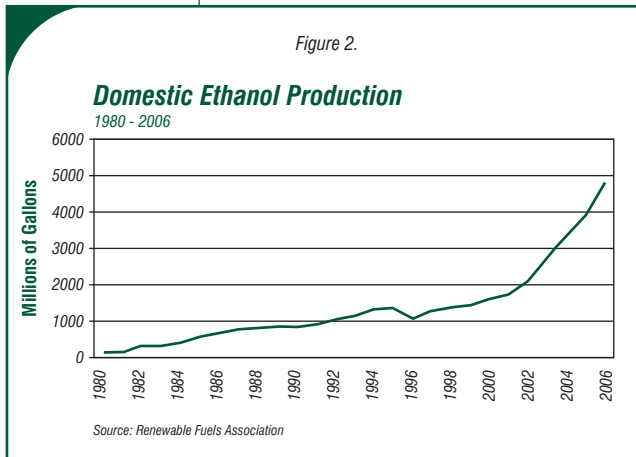


Figure 3.

**Ethanol Investment Plays**

Type	Description	Companies
Pure Play	Firms specializing in ethanol production	BioFuel Energy (BIOF), Pacific Ethanol (PEIX), Xethanol (XNL)
Conglomerate	Diversified firms deriving significant revenue streams from ethanol production	Archer Daniels Midland (ADM), The Andersons (ANDE), MGP Ingredients (MGPI)
Transportation	Firms that specialize in transportation fuel-grade ethanol production	Aventine (AVR), VeraSun (VSE)
Agriculture	Firms specializing in production of feed, fiber, fuel and other goods that derive revenue streams from ethanol production	Monsanto (MON), Panda Ethanol (PDAE), SunOpta (STKL), Bion (BNET)
Automaker	Companies that design and manufacture flex-fuel vehicles	DaimlerChrysler (DCX), Ford (F), General Motors (GM)
Biotech	Biotech firms that develop processes and enzymes that assist in ethanol production	Danisco (DCO.CO), Novozymes (NZYM.CO)

Source: Bradley Woods

Figure 4.

**Ethanol & Biofuels Bills**

Bill Name	Bill #	Description	Status
<b>Renewable Fuel Standards</b>			
CLEAN Energy Act of 2007	HR 6	Would require 36 billion gallons of biofuels per year by 2022	06/21/07: PASSED in the Senate
Cellulosic Ethanol Incentive Act of 2007	S 386	Would require 20.33 billion gallons of cellulosic biomass-derived fuel per year by 2030	01/24/07: Introduced and referred to the Senate Environment & Public Works Committee
Biofuels Security Act of 2007	HR 559	Would require 30 billion gallons of biofuels per year by 2020; and 60 billion gallons by 2030	01/18/07: Introduced and referred to the House Energy Committee
<b>Taxes &amp; Tariffs</b>			
Renewable Energy & Energy Conservation Tax Act of 2007	HR 2776	Creates a new production tax credit of 50 cents per gallon for cellulosic alcohol produced for domestic fuel use. The credit would be in addition to the current 51 cents per gallon ethanol credit and 10 cents per gallon small-producer credit.	06/20/07: CLEARED by the House Ways & Means Committee
Ethanol Tariff Extension and Caribbean Basin Initiative Investigation Act	S 1106	Extends the tariff on imported ethanol, and directs the Treasury Department to study the impact of duty-free ethanol imports on the domestic marketplace.	04/12/07: Introduced and referred to the Senate Finance Committee
<b>Infrastructure</b>			
Ethanol Education & Expansion Act of 2007	S 1491	Bill would provide grants for the installation of E-85 fuel infrastructure.	05/24/07: Introduced and referred to the Senate Energy Committee
Ethanol Infrastructure Expansion Act of 2007	S 859	Directs the DOE to study the feasibility of constructing dedicated ethanol pipelines.	03/13/07: Introduced and referred to the Senate Energy Committee
<b>Federal Funding, Loan Guarantees</b>			
Farm Bill Extension Act of 2007	HR 2419	Provides \$2 billion in funding for biofuels development programs	07/19/07: CLEARED House Agriculture Committee*
A bill to promote the production and use of ethanol	HR 3118	Provides loan guarantees for closed loop ethanol projects and funding for ethanol research.	07/19/07: Introduced and referred to the House Energy Committee
Fiscal 2008 Energy-Water Appropriations Act	HR 2641	Provides \$250 million for corn and cellulosic ethanol and biodiesel development	07/17/07: PASSED in the House
America's Domestic Fuels Act	HR 931	Bill provides for research and development of coal gasification technology as a source in ethanol production.	02/08/07: Introduced and referred to the House Science Committee
<b>Investment</b>			
PROGRESS Act	HR 1300	Would require the DOE to issue renewable fuel regulations to help leverage private capital interested in investing in new cellulosic ethanol plants.	03/01/07: Introduced and referred to the House Energy Committee

\* Farm Bill debate is scheduled on the House floor as of this writing.

Source: Bradley Woods

Figure 5.

**State Renewable Fuels Standards**

State	Level	Timeline	Enacted
California	All fuel must be E10	2010	2007
Hawaii	85% of gasoline consists of E10	Current	2004
Iowa	25% of motor fuel to come from renewable sources	2020	2006
Louisiana	Ethanol: 2% total sales; Biodiesel: 2% total sales	When state achieves threshold in-state production level	2006
Minnesota	Stage I: E10; Stage II: E20	Stage I: Current, Stage II: 2013	2005
Missouri	All fuel must be E10	2008	2006
Montana	All fuel must be E10	When state achieves threshold in-state production level	2005
Oregon	All fuel must be E10	When state achieves min. in-state production level of 40 million gallons per year	2007
Washington	Ethanol: 10% total sales; Biodiesel: 5% total sales	When state achieves threshold in-state production level	2006

Source: PEW Center on Global Climate Change

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