

2012 Pocket Guide to Ethanol



 **RFA** RENEWABLE
FUELS
ASSOCIATION

www.EthanolRFA.org

Ethanol Basics 101

Fuel ethanol is a high octane motor fuel derived from plants that can be safely used in virtually every engine platform today at varying levels. At nearly 14 billion gallons of production, ethanol represents approximately 10% of the nation's gasoline supply and can be found in more than 95% of all gasoline sold.

Generally speaking, the majority of consumers are using E10 ethanol blends (10% ethanol). More than 9 million consumers driving flex-fuel vehicles, or FFVs, can use any blend of ethanol from E10 up to E85 (85% ethanol).

Ethanol is part of our nation's solution to reducing our dependency on imported oil, creating domestic jobs, cleaning our environment by reducing dangerous emissions caused by burning gasoline, and helping to improve engine performance by adding much needed octane.

Ethanol is increasingly becoming a global commodity. Global ethanol production and demand is way up, with the U.S. now the world's top producer, consumer, and exporter of fuel ethanol.



Key Ethanol Stats (January 2012)

Number of Operating Plants.....	209
Operating Production Capacity.....	14.9 billion gallons
Capacity Under Construction.....	140.0 million gallons
States with Ethanol Facilities.....	29

Historic Ethanol Production

(in billions of gallons)

2011.....	13.9*
2010.....	13.2
2009.....	10.75
2008.....	9.2
2007.....	6.5

*estimated

Top Five Ethanol-Producing States

Iowa
Nebraska
Illinois
Minnesota
Indiana



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Ethanol Production Stats

- The average dry mill today uses less than 26,000 BTUs of thermal energy to produce a gallon of ethanol, compared to the 77,000 BTUs of energy contained in the gallon.
- Each bushel of corn yields 2.8 gallons of ethanol and 17.5 pounds of livestock feed.
- The average dry mill ethanol biorefinery uses 47% less water per gallon than in 2001.
- Ethanol yields between 1.9 and 2.3 units of energy for every one unit of energy used in production, according to USDA research.

Answering Calls for Fuel, Feed and Food

Modern ethanol production is about more than fuel. Ethanol producers are providing increasing amounts of livestock feed products—distillers grains, corn gluten, and corn gluten meal—while simultaneously providing growing volumes of corn oil and other bio-based chemicals to replace oil.

Using just 3.2% of the world's grain supply and none of its food grains like rice or wheat, the U.S. ethanol industry produced more than 39 million metric tons of high quality livestock feed in 2011. The U.S. exported approximately 8 million metric tons.

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Ethanol and Corn Use: Beyond the Headlines

Ethanol production returns 1/3 of every bushel of corn entering an ethanol biorefinery back to the livestock feed market. In fact, USDA studies have shown these feed products carry greater value than traditional feed rations because they replace both corn and soybeans used in the process. As a result, distillers grains and other ethanol feeds are making greater supplies of both corn and soybeans available for other uses.



Historic Corn Production

(billions of bushels)

2011:.....	12.36
2010:.....	12.45
2009:.....	13.2
2008:.....	12.1
2007:.....	13.1

Historic Feed Production

(mil of metric tons)

2011:.....	39.4
2010:.....	32.5
2009:.....	30.5
2008:.....	26.6
2007:.....	23.0

Historic Corn Use

(gross billions of bushels)

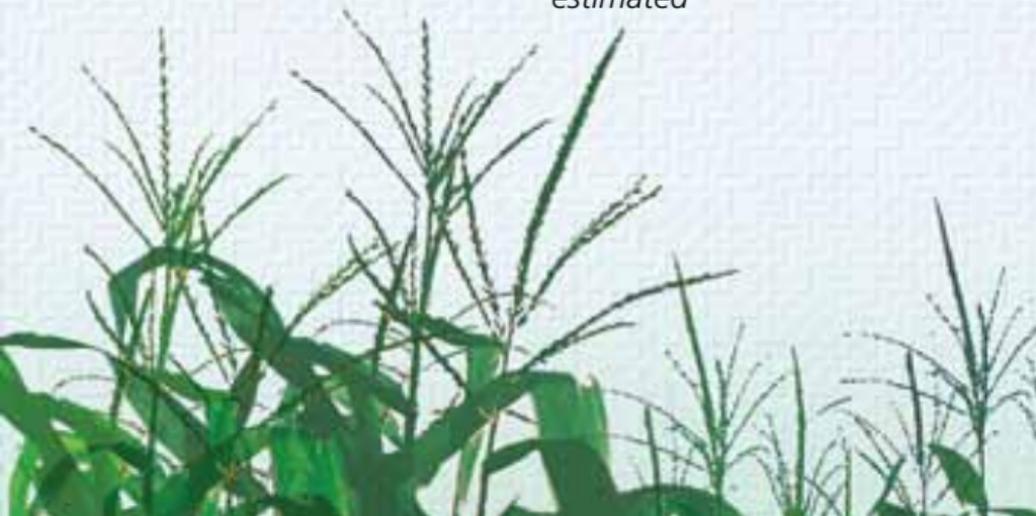
2011:.....	5.0
2010:.....	4.65
2009:.....	3.8
2008:.....	3.2
2007:.....	2.3

Historic DDGS/ Feed Exports

(mil of metric tons)

2011:.....	8.0*
2010:.....	9.0
2009:.....	5.5
2008:.....	4.5
2007:.....	2.3

**estimated*



Domestic Market Expansion

The domestic market for ethanol has long been artificially constrained at 10% of the nation's gasoline supply by antiquated fuel regulations and engine technology. In 2012, a new ethanol blend (E15) will join E85 and other mid-level ethanol blends like E30 in giving American drivers a real choice at the pump.

Commercializing E15

4 In January 2011, the U.S. Environmental Protection Agency (EPA) approved the use of E15 (15% ethanol, 85% gasoline) fuel in light duty cars, trucks and SUVs model year 2001 and newer and all flex-fuel vehicles (FFVs). Vehicles older than 2001, small engines, boats and motorcycles were not approved for E15 fuel use. E15 can be used by 62% of the light duty vehicles on the road today, representing more than 80% of the unleaded fuel sold.

As it was with E10, achieving significant market penetration with E15 will take time but must be accomplished. A nationwide E15 market would represent nearly 20 billion gallons of annual ethanol demand. Seamlessly integrating E15 into the fuel choices of Americans is critical to the success of the Renewable Fuel Standard (RFS) and creating the market demand that will encourage investment in cellulosic ethanol technologies.



The EPA developed an E15 label for retailers to use on their fueling pumps. The labels will be required on every pump offering E15 once EPA has certified the fuel for commercial sale as required by Section 211(b) of the Clean Air Act. RFA will be offering these labels for free once the EPA approval has been granted to avoid any illegal sales of the fuel.

Bringing More Ethanol Blends to the Marketplace

While efforts to successfully introduce E15 to consumers are ongoing, the industry remains committed to expanding the use of all ethanol blends. Through joint industry efforts like the Blend Your Own (BYO) Ethanol campaign from RFA and the American Coalition for Ethanol, fuel marketers and retailers are being provided the necessary information to gain comfort with and ultimately install blender pumps that can dispense a wide range of ethanol blends—from E10 to E85.

For more information, visit www.BYOEthanol.com.

There are currently over **2,860 gas stations in the U.S. that serve E85 fuel**. This ethanol-fuel blend is for use in flex-fuel vehicles (FFV) only. FFVs are the surest, most cost-effective way to provide consumers the engine technology they need to utilize higher level blends. More information can be found at www.ChooseEthanol.com.

Increasing National Security

America's dependence on imported oil has very significant impacts on our security and how America is forced to use its military might. Hostile provocations from tyrannical petro-dictators threaten to cut off vital oil supply routes like the waters in the Strait of Hormuz. At 10% of the nation's gasoline supply, ethanol is providing a domestic, renewable alternative to imported oil that doesn't require the protection of the U.S. Navy to get to market.

Displacing Imported Oil

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Ethanol remains the only domestic renewable fuel that is meaningfully reducing America's dependence on foreign oil. In 2011, **American ethanol use helped reduce the need for imported oil by 485 million barrels.** That is roughly the equivalent of 13% of total U.S. crude oil imports, saving the American economy \$49.7 billion.

Growing Domestic Energy Supplies

Ethanol also has an impact on the domestic energy markets. Of all the gasoline gallons refined from U.S.-based oil, ethanol represents 25% of all those gallons. Put another way, American ethanol producers represent 1 out of every 4 gallons of fuel produced in the U.S. from domestic sources—be they oil or biomass.

Ethanol and National Security

“There are great strategic reasons for moving away from fossil fuels. It’s costly. Every time the cost of a barrel of oil goes up a dollar, it costs the United States Navy \$31 million in extra fuel costs. But it’s costly in more ways than just money. For every 50 convoys of gasoline we bring in, we lose a Marine. We lose a Marine, killed or wounded. That is too high a price to pay for fuel.”

—Secretary of the Navy Ray Mabus

“ [The current energy policy] is to buy from a cartel who drives the price and go to war every few years to maintain that privilege. It is outrageous. The good news is that there is an alternative. The good old fashion American idea of introducing competition into the fuel market.”

—Robert McFarlane, National Security Advisor under President Ronald Reagan



Stimulating America's Economy

Domestic ethanol production is an unrivaled economic engine in hundreds of communities all across the country. It is helping revitalize rural communities, create new jobs requiring strong math and science skills, and putting more money in the pockets of Americans through increased wages and lower gasoline prices.

Adding jobs, adding value

American ethanol producers are helping 401,600 Americans find work or keep the job they have, including creating 90,200 direct jobs. These jobs help add \$42.4 billion to the Gross Domestic Product (GDP) and pump \$30 billion into the budgets of hundreds of thousands of American households.

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Saving money at the pump

A study by Iowa State University and the University of Wisconsin found that **in 2010, domestic ethanol production helped keep gasoline prices \$0.89 lower per gallon than they otherwise would have been.** For the first decade of the 2000's, the researchers found **ethanol's price-lowering impact average \$0.25 per gallon.**

Ethanol and the Economy:

- 90,200 direct jobs
- 311,400 indirect/
induced jobs
- \$42.4 billion
contribution to GDP
- \$29.9 billion in
household income



Expanding the Global Marketplace

America's ethanol industry not only leads the world in the production and use of ethanol, it is also the largest exporter of fuel ethanol and ethanol feed co-products like distillers grains. These markets have proven to be important factors helping aid the growth of domestic ethanol production from all sources.

Ethanol Exports

2011 was a record year for U.S. fuel exports. American producers sent 1.1 billion gallons of denatured and undenatured ethanol to overseas markets. Importantly, these gallons were not blended with gasoline and therefore not eligible for the now-expired ethanol blenders' credit known as VEETC.



Historic U.S. Ethanol Imports

(in millions of gallons)

2011:.....	160.0*
2010:.....	10.0
2009:.....	193.7
2008:.....	600.0
2007:.....	435.2

**estimated*

Historic U.S. Ethanol Exports

(Denatured, Undenatured,
Non-beverage)

(in millions of gallons)

2011:.....	1,100.0*
2010:.....	396.0
2009:.....	113.3
2008:.....	157.7
2007:.....	150.2

**estimated*

2011 Top Global Ethanol Producers

(in millions of gallons)

U.S:	13,900.00*
Brazil:	5,573.24
E.U:	1,199.31
China:.....	554.76
Canada:.....	462.30

**estimated*



Across the Nation

State lawmakers are showing an increased appetite for addressing renewable fuel policies at a more local level. Many of these, particularly in states familiar with the benefits of ethanol, could be very positive for the industry. An increasing number of states, however, are seeking to undermine progress the nation has made in reducing our addiction to imported oil.

E15 Efforts

Many state lawmakers and regulators are constructively engaging with the RFA to ensure a smooth introduction of E15 ethanol blends in the marketplace. These efforts include addressing safety and fuel regulations that govern the sale of gasoline.



Eye on the States

From efforts to ban ethanol in New Hampshire to labeling concerns in Nebraska to a repeal threat of the Florida Renewable Fuel Standard, anti-ethanol interests are motivating their state affiliates in an effort to dismantle domestic ethanol production from the ground up. The RFA has and will continue to work with our members and the industry to address anti-ethanol state initiatives and look for opportunities to expand ethanol markets in all 50 states.

California LCFS

A federal court judge ruled in late 2011 that California's Low Carbon Fuel Standard (LCFS) violated the Commerce Clause of the Constitution. The rule is a win for U.S. ethanol producers as it could keep the single largest market for ethanol open for all domestic producers, regardless of feedstock. The ruling is being appealed and the litigation is far from over. The RFA continues to work with the state to adopt more appropriate and realistic carbon accounting schemes to properly reflect the carbon benefits of U.S. ethanol.



Glossary Terms

1 bushel of corn = 2.8 gallons of ethanol and 17.5 pounds of livestock feed

1 gallon of ethanol contains 77,000 BTUs

Ethanol has an octane rating of 113

Ethanol—a colorless, renewable alcohol fuel processed from grain, plant sugars, and other plant material.

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Cellulose—a developing feedstock for ethanol production, it is the material in plants that holds them together and contains sugars that are increasingly cost effective to convert into ethanol.

E15—(15% ethanol, 85% gasoline) this ethanol-blended fuel has been approved by the U.S. Environmental Protection Agency (EPA) for light duty vehicles model year 2001 and newer, and all flex-fuel vehicles (FFVs).

Mid-Level Ethanol Blends (MLEBs)—commonly sold in Blender Pumps, these fuel blends are comprised of between 20 and 40 percent ethanol. High-Level Ethanol Blends (HLEB) range from 40 to 85 percent ethanol.

Blender Pumps—gasoline dispensers that allow station owners to offer multiple ethanol blends from E0 to E85, and provide consumers a choice in what fuel they put in their tank.

Low Carbon Fuel Standard (LCFS)—a rule enacted to reduce the carbon intensity from fuel powered vehicles using transportation fuels such as petroleum.

Carbon Intensity—the measurement of lifecycle carbon emissions for any product, including fuels.

Distillers Grains (DDGs)—the nutrient-rich livestock feed co-product of ethanol production from grain sources.

Flex-Fuel Vehicle (FFV)—a specifically designed vehicle with an engine capable of running on ethanol blends up to 85%.

Renewable Fuel Standard (RFS)—sets mandatory blend levels for renewable fuels while also establishing greenhouse gas (GHG) reduction criteria and a methodology for calculating lifecycle GHG emissions.

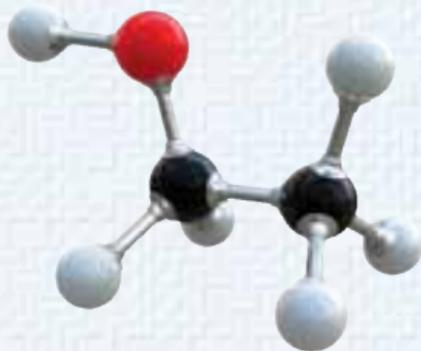


The Advanced Ethanol Council

In 2011, the RFA formed the Advanced Ethanol Council (AEC). The AEC is singularly focused on accelerating the commercialization of advanced ethanol through visionary public policies that unleash the full potential of these advanced technologies and launch new market opportunities for ethanol.

The market created by existing ethanol production is helping pave the way for stand alone, or green field, advanced and cellulosic ethanol biorefineries. Scores of ethanol technology companies are already into the demonstration phase of production, proving that technologies that convert everything from corn stalks to grasses to garbage to algae into ethanol are viable. Importantly, many of these companies are beginning to break ground on commercial-scale biorefineries that will provide tens of millions of gallons of ethanol from a wider range of feedstocks.

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RFA at a Glance

RFA is the leading trade association for America's ethanol industry. Its mission is to advance the development, production, and use of ethanol fuel by strengthening America's ethanol industry and raising awareness about benefits of renewable fuels. RFA's 200 members are working to help America become cleaner, safer, more energy independent and economically secure.

Every day, the RFA works hard to provide timely and comprehensive industry information to its members and consumers on numerous issues including legislative and regulatory, technical and research, and market development. RFA's expertise is showcased in its constantly updated industry statistics, scientific analysis, industry best practices, and ethanol standards and specifications. RFA's success is driven by its active and engaged members who serve on committees like the Technical Committee, Environmental Committee, Co-products Committee, the Plant & Employee Safety Committee, and more important, participate fully on the Board of Directors.





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