



UNIVERSITY OF ILLINOIS
EXTENSION

Ethanol



Biofuels and the Consumer

What Are Biofuels?

Biofuels are any fuels made from renewable sources. Currently, the most common biofuels are ethanol, made from corn, and biodiesel, made from soybeans, canola, or other oil crops, and animal fat.

Most Illinois consumers have the opportunity to purchase and use biofuels at their local fuel station.

Ethanol

Ethanol is widely available to consumers in two blends. E10 is a blend of up to 10 percent ethanol and 90 percent unleaded gasoline. Flexible fuel vehicles can use E85, which is a blend of up to 85 percent ethanol and 15 percent unleaded gasoline. As of December 2008, 194 Illinois gas stations carried E85.

In Illinois, any gasoline that contains more than one percent ethanol must be clearly labeled at the gas pump.

For more information about using ethanol in motor vehicles, see the University of Illinois Extension fact sheet, "Ethanol Use in Motor Vehicles."

Ethanol Economics

Since its inception up until the volatile fuel market in late 2008, ethanol blended fuel has generally been less expensive for consumers, while providing higher octane levels. Crude

oil prices, federal and state policy, corn prices and transportation costs are some of the factors that can affect the supply and demand – and price of ethanol blended fuel for consumers. Policy factors include Renewable Fuels Standards for mandated renewable fuel blends, economics for American agriculture, and energy independence from foreign oil.

Future of Ethanol in Illinois

In 2006, the All-American Energy Plan for the State of Illinois was unveiled. It includes the following goals:

- Invest in renewable biofuels by providing financial incentives to build up to 20 new ethanol plants and five new biodiesel plants. These increases in ethanol and biofuels production would allow Illinois to replace 50% of its current supply of imported oil with renewable homegrown biofuels;
- Increase the number of gas stations that sell biofuels, so that all gas stations offer 85% ethanol fuel (E-85) by 2017 and help the auto industry to produce more and better flexible fuels vehicles that can run on either E-85 or regular gasoline.

Currently Illinois has several incentives available to increase the use of biofuels. The Illinois Environmental Protection Agency's Illinois Green Fleets Program administers those incentives. For more information, visit: <http://www.illinoisgreenfleets.org/fuels/index.html>.



Ethanol and the Environment

Made from renewable resources, ethanol is considered to be environmentally friendly. Because of its high oxygen content (35 percent), ethanol burns cleaner than gasoline. Ethanol is biodegradable and breaks down in water.

Air quality: Carbon monoxide emissions can be reduced by 10 to 30 percent when blending ethanol with gasoline, according to the U.S. Environmental Protection Agency. The American Lung Association of the Upper Midwest has recognized General Motors Flexible Fuel Vehicles using E85 as Clean Air Choice™. According to the American Lung Association, “a typical FFV driver can prevent 4 tons of lifecycle CO₂ and other pollutants from entering our air every year by simply fueling with E85 instead of gasoline. Additionally, using E85 can reduce ozone-forming pollutants by 20% and evaporative emissions by 25 % or more.” For more information, visit: <http://www.cleanairchoice.org/>

Ethanol Production: Ethanol plants are strategically sited because of the proximity to resources, including water, feedstock (in Illinois, corn is the primary feedstock), electricity, natural gas, and transportation – highways, rail, and river barges. Before they are built, ethanol plants must apply for and meet strict permitting requirements to minimize environmental impact.

Water use: Approximately three gallons of water are used to produce one gallon of ethanol, according to the Renewable Fuels Association. The U.S. Environmental Protection Agency estimates that about 44 gallons of water are used to refine one gallon of crude oil.

As ethanol production methods mature, additional improvements have been made in water efficiencies. One of these improvements is water recycling within the production process, especially water used for cooling. Additional processes are now in place to clean water for re-use as well.

Energy efficiency: Most ethanol plants use natural gas to heat the mash of ground corn, water, and enzymes during the fermentation process. Once the fermentation process is complete the left over solids, or distillers grains, may be dried, using additional energy, also usually natural gas. “Solubles” are added back to the distillers grains. Drying the solids allows the ethanol plants to sell the dried distillers grains with solubles (DDGS) as a stable animal feed ingredient that can be shipped long distances. The distillers grains don’t have to be dried when fed to ruminant animals located near the ethanol production plant. Feeding the fresh wet distillers grains (WDG) to ruminants saves the cost of drying, but WDG has to be fed within a few days to avoid spoilage. Additional research is underway to improve processes and create new uses for ethanol byproducts.



Ethanol burns cleaner than gasoline.

“I believe that ethanol plants will evolve into biorefineries, similar to the petroleum refineries. The biorefineries will produce feedstocks for additional processes, chemicals, bioplastics, and other materials. Those biorefineries will compete with petroleum refineries to produce many of our future chemicals.”

—Dr. Hans Blaschek, director of the Center for Advanced BioEnergy Research (CABER) and microbiology professor for Food Science and Human Nutrition, both part of the College of Agricultural, Consumer and Environmental Sciences at the University of Illinois.

Resources:

- American Lung Association of the Upper Midwest: <http://www.cleanairchoice.org/>
- Bioenergy Science Center (Oak Ridge National Laboratory): <http://bioenergycenter.org/>
- Corn Refiners Organization (wet milling): <http://www.corn.org/>
- Energy Information Administration (U.S. Department of Energy): <http://www.eia.doe.gov/fuelrenewable.html>
- Growth Energy: <http://www.growthenergy.org/2009/index.asp>
- Illinois Corn Growers Association: <http://www.ilcorn.org/>
- Illinois Environmental Protection Agency's Illinois Green Fleets Program: <http://www.illinoisgreenfleets.org>
- National Corn Growers Association: <http://www.ncga.com/>
- Renewable Fuels Association: <http://www.ethanolrfa.org/>
- U.S. Environmental Protection Agency:
 - Alternative Fuels: <http://www.epa.gov/otaq/consumer/fuels/altfuels/altfuels.htm>
 - Renewable Fuels Standards Program: <http://epa.gov/otaq/renewablefuels/>



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