

Ethanol Myths: Under the Microscope

Ethanol is a clean, renewable fuel that is helping to reduce our nation's dependence on oil and can offer additional economic and environmental benefits in the future. This fact sheet is intended to address some common misconceptions about this important alternative fuel.

MYTH: Ethanol cannot be produced from corn in large enough quantities to make a real difference without disrupting food and feed supplies.

FACT: Corn is only one source of biofuel. In the future, a significant amount of ethanol will be made from other biomass sources.

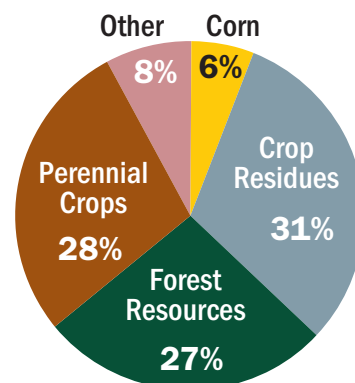
- The corn used to produce ethanol today is the type used as animal feed—not what you find on your dinner table. Ethanol processing also creates a byproduct suitable for use as an additive to livestock feed.
- Future ethanol production will come primarily from cellulose found in crop residues (stalks, hulls), forestry residues (forest thinning, wood byproducts), energy crops (switchgrass), manure, and other wastes.

MYTH: More energy goes into producing ethanol than it delivers as a fuel.

FACT: Each gallon of corn ethanol today delivers as much as 67% more energy than is used to produce the ethanol.

- Over the last two decades, the amount of energy needed to produce corn ethanol has decreased because of improved farming techniques, more efficient use of fertilizers and pesticides, higher-yielding crops, and advances in conversion technology.
- Today, ethanol has a positive energy balance. That is, the energy content of corn ethanol is greater than the energy used to produce it. Better yet—cellulosic ethanol will deliver four to six times as much energy as needed to produce it.

Future biomass feedstocks will come primarily from non-food resources.



Energy Input for Ethanol Production

To grow and harvest, transport to facility, convert to ethanol, and distribute



Average Energy Outputs*

From cellulosic ethanol



From corn ethanol



TODAY

TOMORROW

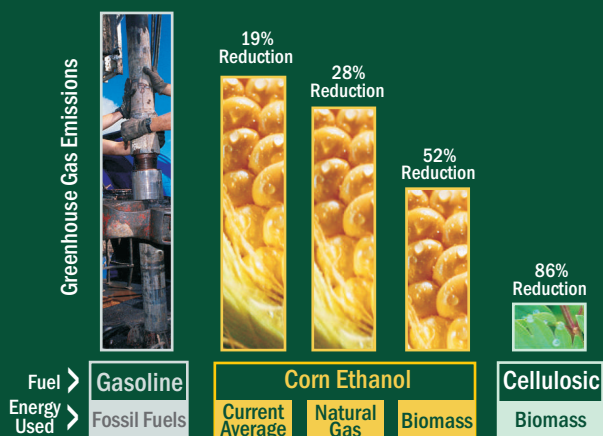
*Corn ethanol provides between 1.3 and 1.7 times the energy used to produce it, while cellulosic ethanol provides between 4.4 and 6.1 times the energy used to produce it.

MYTH: When it comes to environmental emissions, ethanol is the same as gasoline or worse.

FACT: Ethanol results in fewer greenhouse gas (GHG) emissions than gasoline and is fully biodegradable, unlike some fuel additives.

- The higher the amount of ethanol blended with gasoline, the lower the GHG emissions.
- Cellulosic ethanol has the potential to reduce greenhouse gas emissions by up to 86%.
- Ethanol readily biodegrades without harm to the environment, and is a safe, high-performance replacement for toxic fuel additives such as MTBE, a possible carcinogen.
- Use of ethanol can increase emissions of some air pollutants because of the fossil energy used for farming and biofuel production. Emissions can be reduced by using renewable power and improved farming methods.
- Production of ethanol requires a third less fossil energy than gasoline, reducing GHG emissions.

Greenhouse Gas Emissions of Fuels Vary by Feedstock and Type of Energy Used for Processing



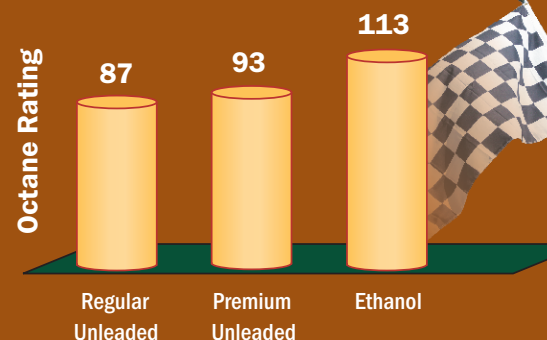
Source: Wang et al, *Environmental Research Letters*, Vol. 2, 024001, May 22, 2007

MYTH: Using ethanol-gasoline blends can lower your fuel economy and may harm your engine.

FACT: The ethanol blends used today have little impact on fuel economy or vehicle performance.

- Ethanol has the highest octane rating of any fuel and keeps today's high-compression engines running smoothly.
- On a gallon-for-gallon basis, ethanol delivers less energy than gasoline. However, today's vehicles are designed to run on gasoline blended with ethanol in small amounts (10% or less), with no perceptible effect on fuel economy.
- Flex-fuel vehicles designed to run on higher ethanol blends experience reduced miles per gallon, but these engines can be tuned to minimize detrimental effects on fuel economy.

Race cars of the Indy Racing League benefit from the high performance characteristics of 100% ethanol.



Sources

Energy:

"Ethanol: Energy well spent," by N. Greene and R. Roth, *Industrial Biotechnology*, p. 86, Spring 2006.

Energy balance: The 2001 Net Energy Balance of Corn Ethanol, www.usda.gov/oce/report/energy/net_energy_balance.pdf

Net Energy Balance for Ethanol Production, www.eere.energy.gov/biomass/net_energy_balance.html.

Fuel economy, www.ethanolrfa.org/resource/facts/engine/

"Biomass FAQs," DOE Biomass Program, www.eere.energy.gov/biomass/biomass_basics_faqs.html

Environment:

Wells-to-Wheels Analysis of Advanced Fuel/Vehicle Systems, May 2005, www.transportation.anl.gov/software/GREET/publications.html#reports

EPA: www.epa.gov/otaq/renewablefuels/420f07035.htm

Feedstocks:

Biomass as Feedstock for a Bioenergy and Bioproducts Industry: Technical Feasibility of a Billion Ton Annual Supply. 2005. DOE and USDA.

For additional information, please contact:

The EERE Information Center
(877) EERE-INF (337-3463)
www.eere.energy.gov/informationcenter

Visit our website at
www.eere.energy.gov/biomass

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



U.S. Department of Energy
**Energy Efficiency
and Renewable Energy**

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable