Ethanol Is Bad for Consumers, Bad for the Environment, and Does Effectively Nothing for "Energy Independence"

Robert Bryce

> "Ethanol is terrific, especially with the new process, and I am totally in favor of ethanol, 100 percent. And I will support it."[1]
>
> **DONALD TRUMP**

> "We need to strengthen the Renewable Fuel Standard so that it drives the development of advanced biofuels and expands the overall contribution that renewable fuels make to our national fuel supply."[2]
>
> **HILLARY CLINTON**

On the Record

> There is no economic, environmental, or national security basis for government support of the ethanol boondoggle.
>
> **Robert Bryce**, Senior Fellow, Manhattan Institute

In Reality

Since the 1970s, the U.S. government has been subsidizing the production of—or mandating the consumption of—corn ethanol. Promoters of the fuel have made many claims about the alleged benefits of corn ethanol, including its lower cost, its ability to reduce carbon-dioxide emissions, and its ability to reduce America's dependence on imported oil. None of these claims is true.

Key Findings

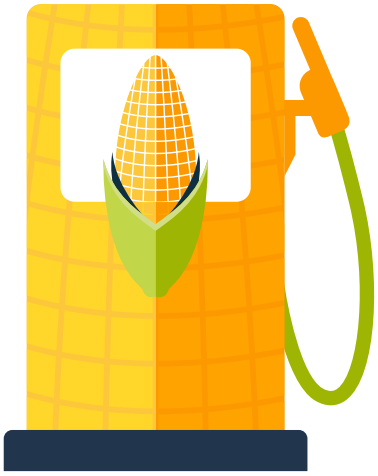
- Americans have spent a total of $170 billion on federal corn ethanol subsidies and mandates.
  - Since 1982, corn ethanol, a de facto fuel tax, has always cost more than conventional gasoline on an energy-equivalent basis; during 2005–15, corn ethanol averaged $0.98 per gallon and cost motorists an additional $104 billion at the pump.
  - Since 1982, federal subsidies for corn ethanol have totaled $66 billion.
- Corn ethanol emits more greenhouse gases than conventional gasoline.
  - Americans' use of corn ethanol has produced greater carbon-dioxide emissions than would the Keystone XL pipeline; ethanol's carbon intensity is higher than that of oil sands, too.
- Corn ethanol, which satisfies the equivalent of only 3 percent of U.S. oil demand, has no noticeable effect on America's "energy independence."
  - In less than a decade, the U.S. oil sector has increased production by 3.6 million barrels per day, or six times the amount of energy produced by America's ethanol distilleries—distilleries that required more than three decades of federal subsidies and mandates.

On the Record

"The corn ethanol mandates are a relic of disco-era energy policies that have no relevance in today's global energy market.[4] Corn ethanol costs more and is worse for the environment than conventional gasoline and does effectively nothing to reduce our need for foreign oil. If retailers want to use corn ethanol in their fuel, they should be allowed to do so. Requiring them to use ethanol provides yet another example of how misguided policymakers are allowing a rent-seeking industry to socialize the costs of its product while privatizing the profits. It's time to unplug the ethanol mandates."

Robert Bryce, Senior Fellow, Manhattan Institute

Since **1982, ethanol** has cost **Americans $170 billion.**



$0.98 per gallon

(That's the ethanol cost premium over standard gasoline)

Costs More, Does Less

There are many reasons to object to the use of biofuels in general and corn ethanol in particular.[5] In the past few years, analysts have documented a litany of problems with corn ethanol, including its effect on food prices,[6] its impact on land use,[7] and the damage it can cause to boats and small engines.[8] But a more fundamental problem is its high cost compared with conventional gasoline. That higher cost is directly related to corn ethanol's lower energy density.

Ethanol contains about 76,000 Btu per gallon. Gasoline contains about 114,000 Btu per gallon.[9] To obtain the same amount of energy contained in a gallon of gasoline, a motorist must buy 1.5 gallons of ethanol.

Fueleconomy.gov, a website run by the U.S. government, advises that vehicles running on the most common form of ethanol-blended fuel, E10 (10 percent ethanol and 90 percent gasoline), will typically get "3 to 4 percent fewer miles per gallon" than they would if they were running on pure gasoline.[10] That mileage penalty must be paid at the pump through the purchase of additional fuel.

Federal law requires fuel retailers to blend about 13 billion gallons of corn ethanol per year into the gasoline they sell to the public.[11] In all, between 2005—when Congress passed the first ethanol mandates—and mid-2015, about 99 billion gallons of ethanol were mixed into U.S. gasoline supplies.[12] During that period, the energy-equivalent cost of ethanol averaged about $0.98 per gallon more than gasoline: motorists thus incurred about $104 billion, or roughly $10 billion annually, in additional fuel costs over and above what they would have paid for gasoline alone.[13] The ethanol mandate is, in short, a fuel tax on motorists.

In October 2015, the Agriculture Institute at the University of Tennessee found that "since January 2005, the corn ethanol industry has received almost $50 billion in cumulative taxpayer and market subsidies." The same study estimated that, since 1982, the total amount of subsidies provided to corn ethanol is about $66 billion.[14] Thus, during 1982–2015, the cumulative cost of America's corn ethanol boondoggle—when accounting for higher fuel costs and subsidies—is approximately $170 billion.

Corn Ethanol Does Not Reduce Greenhouse Gas Emissions

Biofuel producers have frequently claimed that biofuels have an advantage over traditional fuels because biofuels are renewable. But simply because they are renewable does not mean that they are good for the environment.

In May 2015, the Environmental Working Group (EWG) found that "last year's production and use of 14 billion gallons of corn ethanol resulted in 27 million tons more carbon emissions than if Americans had used straight gasoline in their vehicles" and concluded that the use of corn ethanol "has been worse for the climate than projected emissions from the controversial Keystone XL pipeline."

The report also used EPA data to show that the carbon intensity of corn ethanol is about 120 grams of carbon-dioxide equivalent per megajoule of energy produced. That's about 20 percent more than standard gasoline and about 10 percent more than that produced by oil sands.

In August 2015, John DeCicco, a research professor at the University of Michigan's Energy Institute, found that greenhouse gas emissions from corn ethanol are up to 70 percent higher than those from standard gasoline.[15]

The Ethanol Tax = $10 billion per year

(That's how much Americans are paying in additional fuel costs for ethanol over and above what they would have paid for gasoline alone)

The EWG and University of Michigan reports agree with numerous other studies on the greenhouse gas emissions of ethanol. In 2008, a study published in *Science* magazine determined that when accounting for land-use changes, corn ethanol production "nearly doubles greenhouse emissions over 30 years and increases greenhouse gases for 167 years."[16] Also in 2008, researchers at the University of California at Berkeley found that producing corn ethanol from land that was formerly held in the Conservation Reserve Program had greenhouse gas emissions that were 2.4 times greater than those from conventional gasoline.[17] In 2007, Jan F. Kreider, an engineering professor at the University of Colorado, and Peter S. Curtiss, a Boulder-based engineering consultant, concluded that during the entire life cycle of ethanol, carbon-dioxide emissions are "about 50 percent larger for ethanols than for traditional fossil fuels; such fuels are not the answer to global warming, they make it worse."[18]

As early as 1997, analysis done by the Government Accountability Office found that the ethanol-production process produces "relatively more nitrous oxide and other potent greenhouse gases. In contrast, the greenhouse gases released during the conventional gasoline fuel cycle contain relatively more of the less potent type, namely, carbon dioxide."[19]

Ethanol Has Not Reduced the Need for Foreign Oil

Since the 1970s, ethanol boosters have been using the bogeyman of foreign oil to justify subsidies and mandates for their fuel. The result: America's ethanol distilleries now consume nearly 40 percent[20] of all U.S. corn in order to produce fuel equivalent to about 600,000 barrels of oil per day.[21]

By comparison, since 2006, U.S. oil production has increased by more than 3.6 million barrels per day.[22] Thus, in just the last nine years, the U.S. oil sector has increased production by six times the total output of every ethanol distillery in America.

During 2006–14, US oil imports declined from 10.1 million barrels per day to 7.3 million barrels per day, a reduction of 2.8 million barrels per day.[23] That reduction in oil imports must be due to increased domestic oil production. It cannot be credited to corn ethanol because the reduction in oil imports is more than four times the energy output of America's corn ethanol distilleries.

Despite decades of federal support for ethanol production and consumption, America's ethanol sector remains tiny when compared with the country's overall demand for oil. In 2014, U.S. oil consumption totaled 19 million barrels per day.[24] With production of 600,000 barrels of oil equivalent per day, the ethanol sector satisfies only about 3 percent of total domestic oil demand.[25] In 2014, global oil demand totaled 92 million barrels per day[26]—America's ethanol sector now satisfies about 0.7 percent of global oil needs.

Endnotes

1 See https://www.youtube.com/watch?v=Qr6wZPvWx3s.

2 See http://www.c-span.org/video/?327822-1/hillary-clinton-remarks-rural-policy.

3 See http://www.agweb.com/article/berniesanders-embraces-corn-power-blmg.

4 See https://www.extension.purdue.edu/extmedia/id/id-342-w.pdf.

5 In 2007, Congress passed a law requiring fuel retailers to use increasing quantities of "cellulosic ethanol," fuel derived from nonfood crops such as switchgrass or wood. Despite that mandate—which requires the consumption of 16 billion gallons per year by 2022—as well as generous federal subsidies, companies have still not been able to produce enough cellulosic ethanol to meet the requirement. See http://www.energytrendsinsider.com/2015/05/20/where-are-the-unicorns.

6 See http://www.nationalchickencouncil.org/wp-content/uploads/2012/07/RFS-issues-FARMECON-LLC-7-16-12-FINAL.pdf.

7 See http://www.wri.org/publication/avoiding-bioenergy-competition-food-crops-and-land.

8 See http://www.popularmechanics.com/home/tools/reviews/a6640/can-boutique-fuel-save-small-engines-from-the-wear-and-tear-of-e10.

9 See http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf.

10 See http://www.fueleconomy.gov/feg/ethanol.shtml.

11 See http://www.epa.gov/otaq/fuels/renewablefuels/index.htm.

12 See http://www.eia.gov/tools/faqs/faq.cfm?id=90&t=4.

13 See http://www.manhattan-institute.org/pdf/eper_18.pdf.

14 See http://beag.ag.utk.edu/pub/TenYrReviewRenewableFuelStandard_1015.pdf.

15 See https://drive.google.com/file/d/0B7ZwDXl-m2O9TFFiZXdRLUtsWlU/view.

16 Timothy Searchinger et al., "Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land Use Changes," Science, February 7, 2008.

17 Alex Farrell and Michael O'Hare, "Memo to the California Air Resources Board," January 12, 2008, 3. See http://www.arb.ca.gov/fuels/lcfs/011608ucb_luc.pdf.

18 Jan F. Kreider and Peter S. Curtiss, "Comprehensive Evaluation of Impacts from Potential, Future Automotive Fuel Replacements," Proceedings of Energy Sustainability 2007, 12. See http://www.fuelsandenergy.com/papers/ES2007-36234.pdf.

19 Government Accountability Office, "Tax Policy: Effects of the Alcohol Fuels Tax Incentives," March 1997, GAO/GGD-97-41, 6, 17.

20 See https://www.extension.iastate.edu/agdm/crops/outlook/cornbalancesheet.pdf. These data show that in 2015–16, ethanol production will consume about 5.2 billion bushels of corn out of a total harvest of 13.5 billion bushels (5.2 / 13.2 = 39.4 percent).

21 See http://www.ethanolrfa.org/resources/industry/statistics. These numbers, from the Renewable Fuel Association, show that in the first six months of 2015, the U.S. produced about 170 million barrels of corn ethanol. Dividing that figure by 182.5 gives 931,506 barrels of ethanol per day. Ethanol has two-thirds of the heat content of gasoline. Therefore, 931,506 x 0.66 = 614,793 bbloe/d.

22 See http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mcrfpus2&f=a.

23 See http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRIMUS2&f=A.

24 BP Statistical Review of World Energy 2015.

25 If ethanol producers really want to reduce energy imports, they should be required to sell all their fuel in the domestic market. Instead, they are exporting tens of millions of gallons per month (in July 2015, 77.2 million gallons). See http://www.ethanolrfa.org/2015/10/u-s-ethanol-exports-sank-in-august-ddgs-shipments-down-slightly. At the same time that domestic producers are exporting ethanol, U.S. companies are importing Brazilian ethanol because that fuel, which is made from sugarcane, qualifies as an "advanced biofuel" and therefore allows them to make more money in the market for federal biofuel credits. See http://www.reuters.com/article/2015/06/15/usa-biofuels-imports-idUSL1N0YR1XO20150615#b3cHvGcB66gfdUSM.97.

26 BP Statistical Review of World Energy 2015.