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CONGRESSIONAL TESTIMONY

Examining U.S. Biofuels Policy

Subcommittee on Energy and Subcommittee on Environment
Committee on Science, Space and Technology
U.S. House of Representatives

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My name is Nick Loris and I am the Herbert & Joyce Morgan Fellow at The Heritage Foundation. The views I express in this testimony are my own, and should not be construed as representing any official position of The Heritage Foundation. I would like to thank the House of Representatives Committee on Science, Space and Technology's Subcommittee on Energy and Subcommittee on Environment for the opportunity to address U.S. biofuels policy.

In the 1989 film *Field of Dreams* a voice in the sky tells Iowa corn farmer Ray Kinsella, "If you build it, they will come." Ray proceeds to destroy his corn crop to build a baseball field that gives a second chance to a number of professional baseball players. Despite skepticism from his family, Ray's plan saves the farm.

It seems as though politicians and regulators may have watched this film one too many times. Adapting from that famous line, Congress and the Environmental Protection Agency have taken the approach that "if you mandate and subsidize, the market will come."

Throughout the years, Congress has spent tens of billions of dollars by enacting special tax breaks, direct grants, government-backed loans, and loan guarantees. The most pervasive and pernicious biofuel policy is an outright mandate that guarantees biofuel producers a share of the transportation fuel market.[1] To justify biofuels programs, policymakers have promised reduced dependence on foreign oil, a new source of cleaner energy to lower gas prices, a stronger economy, and an improved environment. None of this has materialized in any substantial way.

The problem is not the use of biofuels themselves but rather a set of policies and programs that pick winners and losers—a subsidization of production that benefits a select few while spreading the costs among American families and businesses. Even within the agricultural community, biofuel handouts reward those who are connected to the policy and adversely affect large parts of rural America. Having politicians centrally plan energy decisions has caused market distortions and demonstrated the high costs and unintended consequences of government intervention. Biofuel subsidies affect commodity production, prices, the economy, and the environment and distort energy markets.

Policy reforms that remove preferential treatment for biofuels and eliminate all subsidies for transportation fuels and technologies will promote competition and fuel choice. Removing bureaucracies at America's national labs will empower entrepreneurs to use those vital labor and capital assets for innovative technologies. Ultimately, the market should determine what powers our vehicles, not politicians and regulators.

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[1]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Alternative Fuels Data Center, "Federal Laws and Incentives for Biodiesel," http://www.afdc.energy.gov/fuels/laws/BIOD/US (accessed July 18, 2017).

What Are Biofuels and How Are They Used?

The Environmental Protection Agency (EPA) classifies biofuels as "fuels produced from renewable organic material."[2] Producers ferment sugar (sugarcane, sugar beets) and starch products (corn, potatoes) to create bioalcohols and ferment oilseed crops (soybeans, sunflower seeds) and animal fats to create biodiesel.[3]

Ethanol, the most common biofuel, is made from corn, sugarcane, potatoes, soybeans, and other biomass. In the United States, the most common form of ethanol is corn-based. Before any subsidies and the current biofuels mandates were put in place, ethanol already was a valuable additive to gasoline, allowing fuel to burn more cleanly and more efficiently.[4] The use of biofuels is not new and is not the product of any government policy jumpstarting an infant industry: Henry Ford originally planned for the Model T to run on ethanol, and in 1897, Rudolf Diesel showcased a diesel engine running on peanut oil.[5]

Fuel suppliers mix biofuels into gasoline and diesel at blending stations. The fuel system in most vehicles can only contain gasoline blended with 10 percent ethanol (E10) and 90 percent gasoline. In 2011, the EPA approved a blend of 15 percent ethanol and 85 percent gasoline for model year 2001 and newer vehicles, but it is damaging to engines in older vehicles.[6] In addition, ethanol has proven to be harmful to smaller engines, such as lawnmowers, motorcycles, and boats.[7] Another fuel blend is E85, used in flex-fuel vehicles, which contains "51%–83% ethanol, depending on geography and season."[8] Flex-fuel vehicles have engines that can run on a range of blends of gasoline, including E85. Some gasoline stations offer "blender" pumps that allow consumers to choose which blend to use.[9]

The federal government distinguishes between conventional, first-generation biofuels, and advanced, second-generation biofuels, also known as cellulosic ethanol. Producers generate advanced biofuels from non-food parts of crops and other biomass such as leaves, switchgrass, algae, and woodchips. However, commercial development of fuel from these resources has proven to be difficult.

The Renewable Fuel Standard and Biofuel Subsidies

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[2]U.S. Environmental Protection Agency, "Economics of Biofuels," last updated April 17, 2017, https://www.epa.gov/environmental-economics/economics-biofuels (accessed July 18, 2017).
[3]U.S. Environmental Protection Agency, Pacific Southwest, Region 9, "Learn About Biodiesel," June 30, 2016, http://www3.epa.gov/region9/waste/biodiesel/questions.html (accessed July 18, 2017).
[4]U.S. Department of Energy, Energy Information Administration, "Petroleum & Other Liquids: Oxygenate Production," June 30, 2016, http://www.eia.gov/dnav/pet/pet_pnp_oxy_dc_nus_mbbl_a.htm (accessed July 18, 2017).
[5]Biofuel.org.uk, "Biofuel Facts," http://biofuel.org.uk/biofuel-facts.html (accessed July 18, 2017).
[6]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Alternative Fuels Data Center, "Ethanol Blends," http://www.afdc.energy.gov/fuels/ethanol_blends.html (accessed July 18, 2017).
[7]Ed Perratore, "Gas with Ethanol Can Make Small Engines Fail," *Consumer Reports*, March 22, 2013, http://www.consumerreports.org/cro/news/2013/03/gas-with-ethanol-can-make-small-engines-fail/index.htm (accessed July 18, 2017).
[8]U.S. Department of Energy, "Ethanol Blends."
[9]Ibid.

In response to the oil crisis of the 1970s, Congress passed the first ethanol tax credit—the Energy Tax Act of 1978—in an attempt to reduce dependence on foreign oil. Legislation such as the Biomass Research and Development Act of 2000, Healthy Forests Restoration Act of 2003, and American Jobs Creation Act of 2004 introduced or expanded an assortment of direct and indirect subsidies for biofuels. The federal government awards subsidies not just for the production of biofuels and ethanol plants, but also for biofuels infrastructure.[10] Since 1980, federal taxpayers have spent more than $57 billion on ethanol subsidies. The 2002 farm bill continued to force the growth of a market for biofuel production and use; many of these programs were expanded in the 2008 and 2014 farm bills.[11] State and local subsidies have also encouraged ethanol production and infrastructure.

TABLE 1

Biofuel Subsidies in the 2014 Farm Bill

Program	Function	Funding in 2014 Farm Bill (FY 2014–FY 2018), in Millions of Dollars	
TITLE IX PROGRAMS		**Mandatory**	**Discretionary**
Biobased Markets Program	Requirement for federal agencies to develop a bio-product procurement program, additionally requires contractors to use biobased products on purchases over $10,000	$15	$10
Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program	Loan guarantees for biorefinery construction to convert to biomass to advanced biofuels	$200	$375
Repowering Assistance Program	Payments to eligible biorefineries for use of biomass to operate refinery	$12	$50
Biorefinery Program for Advanced Biofuels	Contracts and payments from USDA to advanced biofuel producers for annual increases in production	$75	$100
Biodiesel Fuel Education Program	Grants to educate the public and governments on the benefits of biodiesel	$5	$5
Rural Energy for America Program	Grants and loan guarantees for development and construction of renewable energy systems, including bioenergy systems, in rural communities	$250	$100
Biomass Research and Development Initiative	Grants, contracts, and financial aid for research, development, and demonstrations of technologies and processes that lead toward commercializing biofuels, feedstocks, and biobased products	$12	$100
Feedstock Flexibility Program for Bioenergy Producers	Program in coordination with the Commodity Credit Corporation that allows the USDA to buy surplus sugar and resell at subsidized rates to bioenergy producers	Such sums as necessary	
Biomass Crop Assistance Program	Matching funds and annual payments to farmers and foresters who want to harvest and deliver biomass feedstocks	$120	$0
Community Wood Energy Program	Grants to state and local governments and "biomass consumer cooperatives" for biomass heating systems	$25	$0
TITLE IX TOTALS		**$694**	**$765**
TITLE VII PROGRAMS		**Mandatory**	**Discretionary**
Sun Grant Program	Grants to universities to research and advance biobased energy technology and other applications within the economy	$0	$75 (annually)

SOURCE: Randy Schnepf, "Energy Provisions in the 2014 Farm Bill (P.L. 113-79)," Congressional Research Service *Report for Congress*, March 12, 2014, http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R43416.pdf (accessed July 22, 2016).

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[10]Taxpayers for Common Sense, "Understanding Federal Subsidies for the Biofuels and Biomass Industries," September 2015, http://www.taxpayer.net/images/uploads/articles/biofuel-report-sept-15.pdf (accessed July 18, 2017).

[11]Landon Stevens, Randy T. Simmons, and Ryan M. Yonk, "Ethanol and the Renewable Fuel Standard," The Institute of Political Economy (IPE) at Utah State University, http://www.usu.edu/ipe/wp-content/uploads/2016/02/Ethanol.pdf (accessed July 18, 2017).

The main source of U.S. biofuel policy is the RFS.[12] The Energy Policy Act of 2005 first mandated that renewable fuels be mixed into America's gasoline supply, primarily by using corn-based ethanol. The 2007 Energy Independence and Security Act increased the quotas significantly. By 2022, a total of 36 billion gallons of biofuels (with a cap of 15 billion for corn-based ethanol) must be blended into the nation's fuel supply. The program does not end in 2022; the EPA, in coordination with the Department of Energy (DOE) and Department of Agriculture, has authority to set yearly renewable volume obligations beyond the years included in the 2007 bill.[13]

The law also authorizes the Environmental Protection Agency (EPA) to adjust the statutory targets if the administrator deems there is an inadequate supply. As discussed later, the EPA has had to significantly reduce its targets for advanced biofuels as producers struggled to make commercially viable quantities. Administrator Scott Pruitt recently released the 2018 targets for the RFS, proposing the first decrease in total volume since 2006.[14] The total target of 19.24 billion gallons for 2018 is slightly lower than the 19.28 billion gallon target for 2017, with a 15 billion gallon conventional target and 4.24 billion gallons in advanced biofuels.[15]

The economic and environmental problems caused by the RFS have led a diverse range of environmental organizations, world hunger activists, economists, energy companies, and many in the agricultural community to oppose the mandate. Within the agriculture community, the National Chicken Council, National Cattlemen's Beef Association, National Pork Producers Council, National Turkey Federation, Milk Producers Council, and many other groups[16] have called on Congress to repeal the standard. Other prominent organizations like the American Petroleum Institute, National Resource Defense Council, American Fuel and Petrochemical Manufacturers, Environmental Working Group, Oxfam, and the United Nations have decried preferential treatment for corn ethanol.[17]

Besides the nearly universal outcry, the policy itself is reaching a breaking point as basic assumptions about the future on which it was built, such as national gasoline consumption and the commercial viability of advanced biofuels, prove to be invalid. Yet powerful biofuel lobbies have

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[12]Energy Independence and Security Act of 2007, 110th Cong., 1st Sess., § 202.
[13]Ibid.
[14]Environmental Protection Agency, Renewable Fuel Standard Program: Standards for 2018 and Biomass-Based Diesel Volume for 2019, https://www.epa.gov/sites/production/files/2017-07/documents/rfs-2018-standards-nprm-2017-07-05.pdf (accessed July 19, 2017).
[15]Ibid.
[16]Letter from Michael C. Formica, Chief Environmental Counsel, National Pork Producers Council, to Lisa Jackson, Administrator, Environmental Protection Agency, "RE: Petition for Waiver or Partial Waiver of Applicable Volume of Renewable Fuel," July 30, 2012, http://www.eesi.org/files/20120730-mf-Final-RFS-Waiver-Petition.pdf (accessed July 18, 2017).
[17]News release, "API and AFPM Tell EPA to Put Consumers First When Setting Ethanol Mandates," American Petroleum Institute, July 27, 2015, http://www.api.org/news-and-media/news/newsitems/2015/july-2015/api-and-afpm-tell-epa-to-put-consumers-first-when-setting-ethanol-mandates (accessed July 20, 2016); Natural Resources Defense Council, "Let the VEETC Expire: Save Billions in Tax Dollars Better Spent on Non-Polluting Energy Technologies," *Green Jobs Facts*, June 2010, http://www.nrdc.org/globalwarming/files/VEETCfs.pdf (accessed July 18, 2017); Sarah Kalloch, "Burning Down the House: Corn as Fuel, Not Food," Oxfam America, October 4, 2012, http://politicsofpoverty.oxfamamerica.org/2012/10/corn-as-fuel-not-food/ (accessed July 18, 2017); and news release, "EPA's Biofuels Mandates Are Unworkable," Environmental Working Group, February 7, 2013, http://www.ewg.org/release/epa-s-proposed-biofuels-mandates-are-unworkable (accessed July 18, 2017).

still been able to get Congress to withhold action on the RFS and its destructive economic and environmental effects.

Free Markets vs. Government Intervention in Energy Consumption

Americans undoubtedly take access to affordable, reliable energy for granted. Turning on the light switch or filling up a car with gasoline is second nature. Temporary power outages cause a great deal of frustration for families and businesses. Much worse, Americans realize the importance of reliable energy when a major natural disaster hits and they cannot power their schools and hospitals, keep their food from spoiling, or heat or cool their homes. Energy touches every aspect of their lives, from providing a daily sense of comfort to powering the global economy. Therefore, having an energy platform that provides choices at competitive prices will only enhance the well-being of families and businesses across the country.

On a larger scale, energy is a critical component to a nation's economic growth. A number of economic analyses have attempted to tease out the relationship between energy consumption and gross domestic product (GDP). Instead of merely pointing to correlation, econometric methods have shown energy consumption as a causal input to future economic growth.[18] For instance, an examination of Canadian data by Fraser Institute economists Ross McKitrick and Elmira Aliakbari find that "energy use in Canada is not a mere by-product of prosperity but a limiting factor in growth: real per capita income is constrained by policies that restrict energy availability and/or increase energy costs, and growth in energy abundance leads to growth in GDP per capita."[19] When the free market operates, resource extraction and production expand greatly and innovative technologies flourish, providing dependable power and competitive prices, creating new job opportunities and generating substantial economic growth.

On the other hand, federal energy policies have blocked access to opportunities, unnecessarily delayed projects, mandated expensive energy production, restricted choice, and given handouts to politically connected energy technologies. Politicians tout these programs as a way to usher in new technologies that will provide jobs and stimulate the economy. In reality, rather than providing an opportunity for all to compete, these policies allocate special benefits to the well-connected. Biofuel policy has certainly been an example of such favoritism.

Perhaps the most perverse consequence of these subsidies is that they obstruct the long-term success and viability of the technologies and energy sources they are ostensibly intended to promote. Instead of relying on a process that rewards competition, subsidies and mandates prevent a company from truly understanding the price point at which the technology will be economically viable. When the government plays favorites, it traps valuable resources in unproductive places and allocates labor and capital away from other potentially more promising investment investments.

The Biofuel Market Without a Mandate

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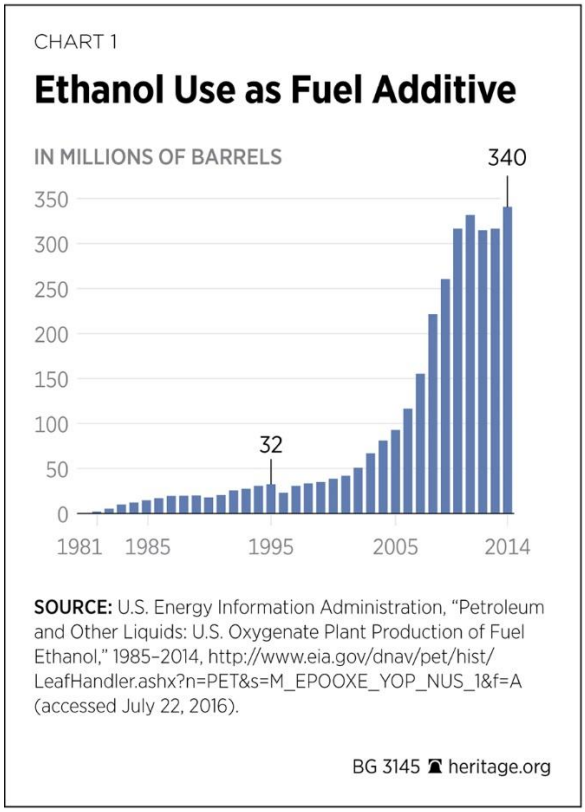
[18]Ross McKitrick and Elmira Aliakbari, "Energy Abundance and Economic Growth: International and Canadian Evidence," Fraser Institute, May 2014, https://www.fraserinstitute.org/sites/default/files/energy-abundance-and-economic-growth.pdf (accessed July 18, 2017).
[19]Ibid.

Evidence indicates that certain biofuels are cost competitive with traditional fuels and make a useful addition to gasoline—without special privileges from Washington. In the year before the federal government mandated the production of ethanol, American companies produced over 81 million barrels of ethanol.[20] Furthermore, ethanol is a cost-effective gasoline oxygenate, a gasoline additive that improves efficiency and helps to meet fuel emissions requirements.[21] A recent University of Tennessee Institute of Agriculture report estimates that in a market with no RFS and no ethanol tax credit, demand for corn ethanol as an oxygenate would have been 4.34 billion gallons in 2014, or about 30 percent of corn ethanol production that year.[22] Reducing government intervention in the biofuel sector and agricultural economy broadly would allow the most competitive elements of the biofuel industry to thrive in a free market. Competition driven by individuals would drive economic growth and benefit all of rural America, not just those special interests that are well-connected in Washington.



[20]U.S. Department of Energy, Energy Information Administration, "Petroleum & Other Liquids: Oxygenate Production."
[21]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Alternative Fuels Data Center, "Ethanol Fuel Basics,"
March 30, 2016, http://www.afdc.energy.gov/fuels/ethanol_fuel_basics.html (accessed July 18, 2017).
[22]Daniel De La Torre Ugarte and Burton English, "10-Year Review of the Renewable Fuel Standard: Impacts to the Environment, the Economy, and Advanced Biofuels Development," University of Tennessee, Department of Agricultural and Resource Economics, Institute of Agriculture, October 14, 2015, http://www.ourenergypolicy.org/wp-content/uploads/2015/10/TenYrReviewRenewableFuelStandard_1015.pdf (accessed July 18, 2017). Commissioned by the American Council for Capital Formation.

If biofuels manage to succeed as a competitive source of transportation fuel, it will not be as a result of any taxpayer-funded handout or government-imposed mandate. Whether the industry flourishes or fails is for private actors, using their own resources, to determine. This holds true not just for biofuels, but oil, natural gas, battery technology, or any other fuel source and technology. An enormous profit incentive already exists for fuel producers without the aid of taxpayer money or a government-imposed mandate. American motorists purchased nearly 400 million gallons of gasoline per day in 2016.[23] American households spend $2,000 to $2,500 a year on gasoline. Globally, the transportation fuels market is a multitrillion-dollar opportunity for the most innovative technology to capture.

Chickens, Eggs, and Government Intervention

One common argument for government intervention into the transportation fuels market is the so-called chicken-and-egg problem. That is, auto dealers have a difficult time selling flex-fuel vehicles to consumers if there are no blender pumps in their vicinity. Moreover, gas station owners do not want to install blender pumps if there are no customers for the product. To "solve" the chicken-and-egg issue, both the federal government and state government shave offered generous targeted tax credits to install blender pumps at filling stations. The Biomass Crop Assistance Program (BCAP) and the Rural Energy for America Program, both housed in the U.S. Department of Agricultural (USDA), are other examples. BCAP provides handouts to farmers and ranchers who produce biomass for heat, power, bio-based products, or biofuels. USDA argues that:

> BCAP addresses a classic chicken-or-egg challenge around the start up of commercial-scale bioenergy activities. If commercial-scale biomass facilities are to have sufficient feedstocks, then a large-scale energy crop must exist. Conversely, if profitable crop production is to occur, then viable consumers must exist to purchase the crop.… Many bioenergy facilities need several years to reach commercial scale. BCAP serves as a catalyst to unite these dynamics by reducing the financial risk for landowners who decide to grow unconventional crops for these new markets.[24]

The reality is innovative ideas and technologies overcome chicken-and-egg challenges all the time without government assistance. Cell phones and cell phone towers is one of many examples. It does not matter how many cell phones there are if there is no place to obtain a signal, but producers built cell phone towers and sold cell phones without a massive subsidy or government program initiated by Washington. The same is true for gasoline-powered cars and traditional gasoline or filling stations.[25] These markets started small and became wildly successful. Solving the chicken-and-egg problem occurs routinely without government support. If biofuels (or natural gas vehicles or electric vehicles) are economically viable and meet consumer demands, the biofuel market could enjoy similar success.

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[23]U.S. Energy Information Administration, "Energy Use for Transportation," last updated: June 28, 2017, https://www.eia.gov/energyexplained/?page=us_energy_transportation#tab2 (accessed July 18, 2017).
[24]U.S. Department of Agriculture, Farm Service Agency, "Biomass Crop Assistance Program (BCAP)," *Fact Sheet*, May 2011, https://www.fsa.usda.gov/Internet/FSA_File/bcap_update_may2011.pdf (accessed July 18, 2017).
[25]Michael Sanserino, "Pittsburgh's Century-old Drive-in Gas Station First of its Kind," *Pittsburgh Post-Gazette*, November 30, 2013, http://www.post-gazette.com/business/2013/12/01/FILL-ER-UP/stories/201312010079 (accessed July 18, 2017).

Unintended Consequences of U.S. Biofuel Policy

U.S. biofuel policy is a case study in the unintended consequences of government intervention. In contrast to what politicians and special interests promised, biofuel policies have increased costs for taxpayers and drivers, had little to no impact on oil prices, hurt rural economies, and resulted in unforeseen environmental costs.

Higher Costs for American Taxpayers and Drivers. Federal biofuel policies cost taxpayers $7.7 billion in 2011 and $1.3 billion in 2012 after the expiration of the ethanol blenders tax credit, a 45-cent per gallon tax credit for blending ethanol into gasoline.[26] More than $57 billion in taxpayer dollars have been spent on ethanol subsidies.[27]

Furthermore, ethanol has done little or nothing either to keep fuel prices down, despite the arguments of proponents,[28] or to achieve the nebulous goal of independence from foreign oil. Even though ethanol production has increased as mandated and has accounted for nearly one-third of the increase in domestic fuel production over the past few years, biofuels still constitute a very small overall percentage of domestic gasoline consumption while increasing costs to consumers.

By its very nature, ethanol is not a perfect substitute for oil. Ethanol's energy content is only two-thirds the energy content of petroleum-based gasoline, and while biodiesel is closer to an even exchange at 92 percent of regular diesel's energy content, it is more expensive to fabricate.[29] The DOE's Energy Information Administration (EIA) estimates that gasoline's energy content has decreased 3 percent from 1993–2013 as ethanol use has increased because of federal mandates.[30]

The joint EPA/DOE website, FuelEconomy.Gov, provides telling documentation of these costs. The size of the additional costs varies depending on ethanol and gasoline prices, but the big picture is always the same: The higher the ethanol content, the worse a car's gas mileage is and the more drivers have to spend to go the same distance. As of September 2015, depending on make and model, the typical motorist could spend as much as an additional $600 per year to run his flex-fuel

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[26]Randy Schnepf, "Agriculture-Based Biofuels: Overview and Emerging Issues," Congressional Research Service *Report for Congress*, May 1, 2013, p. 29, http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R41282.pdf (accessed July 18, 2017).

[27]Landon Stevens, Randy T Simmons, and Ryan M. Yonk, "Ethanol and the Renewable Fuel Standard," The Institute of Political Economy (IPE) at Utah State University, http://www.usu.edu/ipe/wp-content/uploads/2016/02/Ethanol.pdf (accessed July 18, 2017).

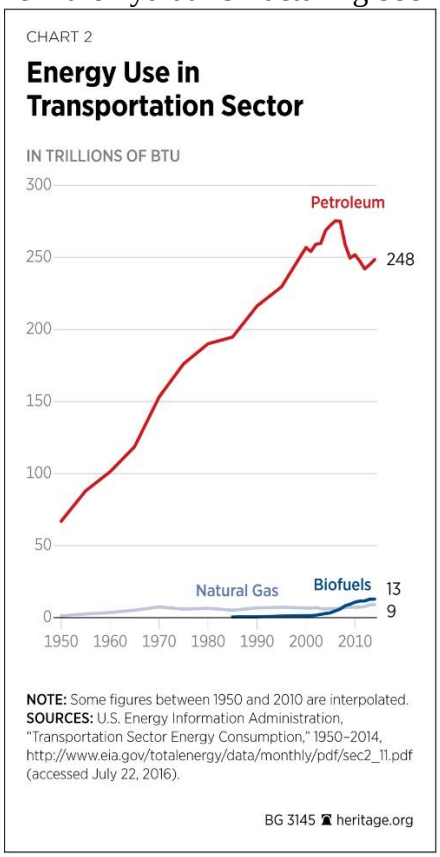
[28]Christopher R. Knittel and Aaron Smith, "Ethanol Production and Gasoline Prices: A Spurious Correlation," July 12, 2012, http://web.mit.edu/knittel/www/papers/knittelsmith_latest.pdf (accessed July 18, 2017).

[29]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, and U.S. Environmental Protection Agency, Office of Transportation and Air Quality, "Ethanol," https://www.fueleconomy.gov/feg/ethanol.shtml (accessed July 18, 2017), and Dan Edmunds and Philip Reed, "E85 vs. Gasoline Comparison Test," Edmunds.com, updated April 29, 2009, http://www.edmunds.com/fuel-economy/e85-vs-gasoline-comparison-test.html (accessed July 18, 2017).

[30]U.S. Department of Energy, Energy Information Administration, "Increasing Ethanol Use Has Reduced the Average Energy Content of Retail Motor Gasoline," *Today in Energy*, October 27, 2014, http://www.eia.gov/todayinenergy/detail.cfm?id=18551 (accessed July 18, 2017).

vehicle on E85 rather than regular gasoline blended with E10.[31] Even when vehicles use premium gasoline, E85 is more expensive for drivers.

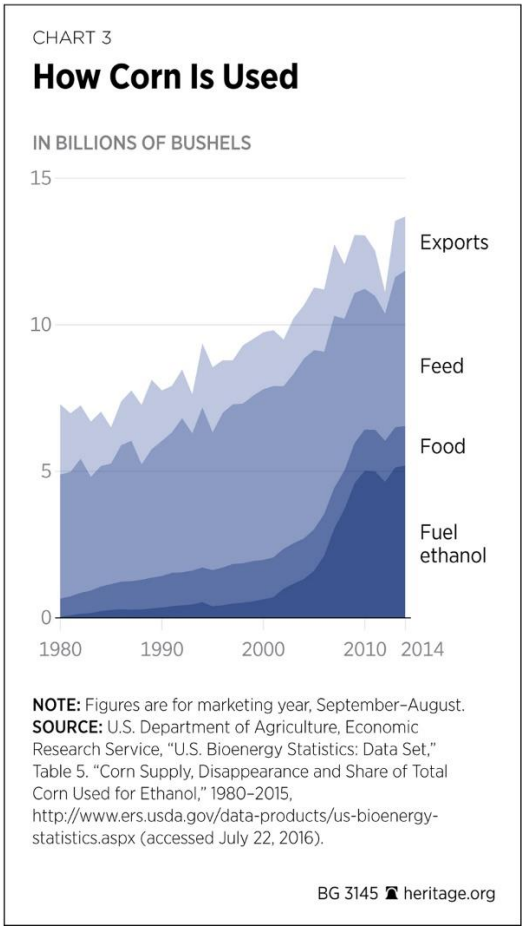
Failure to Reduce Dependence on Oil or Lower Prices. In addition to forcing drivers to pay for a less efficient fuel, the RFS has not delivered on the promise that it would reduce dependence on oil and afford protection from high prices. The large majority of transportation fuel has come from petroleum; even the relative explosion of growth in biofuels as a result of the mandate is dwarfed by the actual demand for fuel. Even with the generous subsidies and RFS mandating its use, biofuels contributed a mere 5 percent of the overall transportation fuel market in 2016.[32] Net imports of crude oil and petroleum products have fallen for a number of reasons, but in large part due to domestic oil production from the hydraulic fracturing boom in the U.S.[33]



Because biofuels contributes such a small percentage of the overall market, ethanol failed to tamp down prices, which mostly continued to climb from 2002 to 2012—despite increased mandated

[31]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, and U.S. Environmental Protection Agency, Office of Transportation and Air Quality, "New Flex-Fuel Vehicles," http://www.fueleconomy.gov/feg/PowerSearch.do?action=noform&path=1&year1=2014&year2=2015&vtype=E85&srchtyp=newAfv (accessed July 18, 2017).
[32]U.S. Energy Information Administration, "Use of Energy in the United States Explained: Energy Use for Transportation," last updated May 17, 2017, https://www.eia.gov/energyexplained/?page=us_energy_transportation (accessed July 19, 2017).
[33]U.S. Energy Information Administration, "Increasing Domestic Production of Crude Oil Reduces Net Petroleum Imports," April 21, 2015, https://www.eia.gov/todayinenergy/detail.php?id=20892 (accessed July 18, 2017).

ethanol use and high oil prices that allegedly made ethanol more competitive.[34] Conversely, ethanol production has had little to do with the dramatic decrease in fuel prices that began in 2013 as a result of significant increases in domestic crude oil production, a decrease that highlighted the disparity in cost and efficiency between ethanol and petroleum-based fuel.

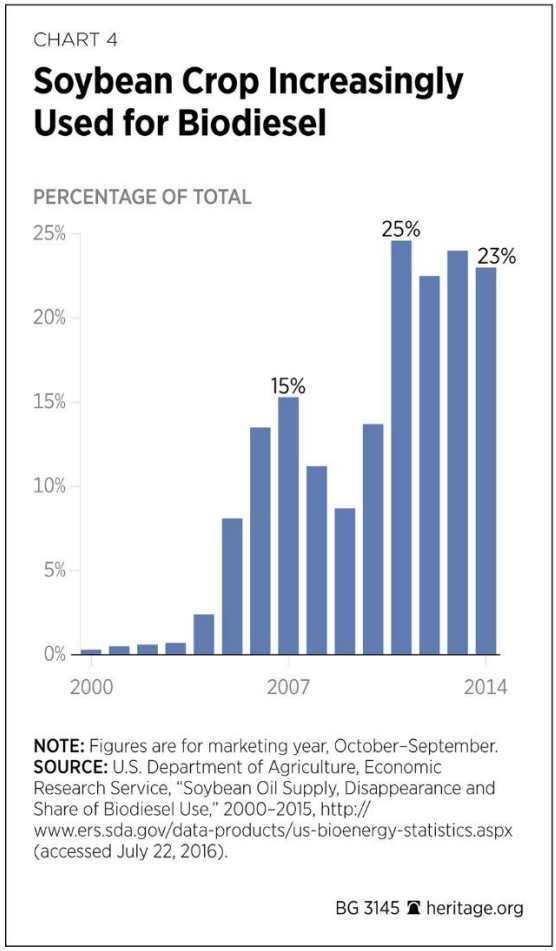


Negative Consequences of Diverting Food to Fuel. The federal government's biofuel policy has diverted food away for fuel, increasing the cost of corn, soybeans, and feedstocks, as well as overall food prices. While the impact of biofuels on fuel consumption is small, the impact on agriculture is large. This increase has hurt both rural America and the world's poorest citizens. The problem is that the diversion of land was a result of the mandates and subsidies. Market forces may very well have moved farmers in this direction, though not likely to such an extent. Nevertheless, the private sector will allocate those resources most efficiently.

From 2010–2012, 49 percent of the U.S. corn crop was used in the food industry and feed for livestock; another 12 percent was exported. Over 40 percent was used to fabricate ethanol fuel to

[34]U.S. Department of Energy, Energy Information Administration, "U.S. Regular All Formulations Retail Gasoline Prices (Dollars per Gallon)," July 18, 2016, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=A (accessed July 18, 2017).

meet the RFS standard.[35] In 2012, the amount of corn used to produce ethanol in the U.S. exceeded the entire corn consumption of the continent of Africa and in any single country with the exception of China.[36] While the majority of biofuel-related food price increases have resulted from the diversion of corn to fuel, diverting soybean crop to biodiesel has had similar effects.



Inflated demand created by the RFS and higher corn prices have incentivized farmers to grow more corn by adding acreage, increasing productivity, or devoting less existing farmland to other crops, but increasing supply to meet higher demand has its own costs. Pressure on the price of corn is exacerbated by the mandate, which requires the use of ethanol or available credits (called RIN credits) regardless of cost, while ranchers, farmers, the food industry, and motorists must take increased corn prices into account. Those who perhaps bear the costs of increased corn prices most

[35]Numbers exceed 100 percent due to rounding. Schnepf, "Agriculture-Based Biofuels," p. 10.
[36]Colin Carter, Gordon Rausser, and Aaron Smith, "Commodity Storage and the Market Effects of Biofuel Policies," University of California–Davis, Department of Agricultural and Resource Economics, http://arefiles.ucdavis.edu/uploads/filer_public/81/ba/81ba961d-fe7b-4629-8511-1b78fdf3b527/carter_rausser_smith.pdf (accessed July 18, 2017).

acutely are farmers and ranchers who use corn for feed and countries that import American corn, which accounts for over 50 percent of the world's corn exports.[37]

The USDA's Economic Research Service notes that "increased corn prices draw land away from competing crops, raise input prices for livestock producers, and put moderate upward pressure on retail food prices."[38] These side effects were all too apparent during the 2012 drought.

The 2012 summer drought destroyed a significant amount of America's crops, drove corn prices up 33 percent, and heightened concerns that the RFS and existing subsidies were needlessly diverting food to fuel.[39] Since corn is a staple ingredient for many foods and an important feedstock for animals, many in the food industry (from cattle and chicken farmers to restaurant associations) expressed concern regarding the mandate's effect on food prices. Rather than going to where market demand valued corn, roughly 40 percent of the corn crop in 2012 was used to create 12.98 billion gallons of corn-based biofuels, or 95 percent of the mandate.[40]

Between July 2012 and August 2012, governors from Arkansas, Delaware, Florida, Georgia, Maryland, New Mexico, North Carolina, Texas, Utah, Virginia, and Wyoming petitioned the EPA for a waiver of the RFS standards, which the EPA denied.[41] According to a recent study by economists from the University of Nebraska–Lincoln, "the drought's impact on corn prices could have been 'fully negated' by reducing the Renewable Fuel Standard by 23 percent that year."[42]

Higher prices resulting from government-created market distortions have a ripple effect well beyond the U.S. A number of organizations have demonstrated a link between biofuel policies and food prices and the adverse consequences of these policies for the world's poorest citizens. The Food and Agriculture Organization of the United Nations, ActionAid, the World Resources

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[37]U.S. Department of Commerce, U.S. Census Bureau, *Statistical Abstract of the United States: 2012*, p. 548, Table 852, "Selected Farm Products—U.S. and World Production and Exports: 2000 to 2010," https://www.census.gov/prod/2011pubs/12statab/agricult.pdf (accessed July 18, 2017).

[38]U.S. Department of Agriculture, Economic Research Service, "Bioenergy: Findings," last updated February 16, 2017, http://www.ers.usda.gov/topics/farm-economy/bioenergy/findings.aspx (accessed July 18, 2017).

[39]Steve Hargreaves, "Calls to Scrap Ethanol Mandate Intensify with Drought," CNN Money, August 6, 2012, http://money.cnn.com/2012/08/06/news/economy/ethanol-drought/ (accessed July 18, 2017).

[40]U.S. Department of Agriculture, Economic Research Service, "U.S. Bioenergy Statistics: Overview," Table 5, "Corn Supply, Disappearance, and Share of Total Corn Used for Ethanol," last updated July 11, 2017, http://www.ers.usda.gov/data-products/us-bioenergy-statistics.aspx (accessed July 18, 2017), and U.S. Environmental Protection Agency, "Fuels Registration, Reporting, and Compliance Help," April 28, 2016, http://www.epa.gov/otaq/fuels/rfsdata/2012emts.htm (accessed July 18, 2017).

[41]Letter from Michael C. Formica to Lisa Jackson, "RE: Petition for Waiver or Partial Waiver of Applicable Volume of Renewable Fuel."

[42]Sunil Dhoubhadel, Azzeddine Azzam, and Matthew Stockton, "The Impact of Biofuels Policy and Drought on the U.S. Grain and Livestock Markets," *Journal of Agricultural and Applied Economics*, Vol. 47, No. 1 (2015), pp. 77–103, http://journals.cambridge.org/download.php?file=%2F3152_77B27E1A13C3BE5D0D0D0E0518D7674B_journals__AAE_AAE47_01_S1074070814000066a.pdf&cover=Y&code=8cf94e31d1162a01454f2789ffa4ab4d (accessed July 18, 2017).

Institute, the Organization for Economic Co-operation and Development, and the World Bank have all listed higher food prices as a resultant concern.[43]

The magnitude of the ethanol mandate's effect on corn prices and overall agricultural products is difficult to determine, partly because of the uncertainty of estimates regarding how much ethanol would be used for fuel absent a mandate, the price impacts of other factors affecting the price of corn, and what other agricultural products farmers would grow absent the mandate. While the magnitude of the mandate's impact on corn prices may not be certain, however, the direction is clear: The RFS has increased demand for corn and consequently has increased prices. According to separate analyses by University of California–Davis economists and a Heritage Foundation economist, the mandate accounts for an increase in corn prices of 30 percent or even as much as 68 percent, respectively.[44] Though other factors such as weather, global markets, and changing food preferences are at work in the price of corn, the RFS has certainly contributed to increased prices.[45]

Biofuel Mandates and Subsidies Do More Economic Harm than Good. Higher food and fuel prices have had adverse economic effects that hurt families and businesses multiple times over. Energy is a necessary input for most economic activities; policies that drive up the price of fuel will not just affect consumers at the pump but through all the goods and services they purchase. Because corn is a staple input for agricultural products, higher food prices hurt other farmers as well as small businesses like restaurant franchise owners. One owner of four Wendy's franchises claimed the RFS cost each restaurant $20,000 to $30,000 per restaurant.[46]

Proponents of the RFS and preferential treatment for biofuels sold these policies as a way to support economic growth in rural communities. While a select few have certainly benefitted, one

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[43]See Aziz Elbehri, Anna Segerstedt, and Pascal Liu, *Biofuels and the Sustainability Challenge: A Global Assessment of Sustainability Issues, Trends and Policies for Biofuels and Related Feedstocks*, United Nations, Food and Agriculture Organization, Trade and Markets Division, 2013, http://www.fao.org/docrep/017/i3126e/i3126e.pdf (accessed July 18, 2017); Tim Searchinger and Ralph Heimlich, "Avoiding Bioenergy Competition for Food Crops and Land," World Resources Institute *Working Paper*, January 2015, http://www.wri.org/sites/default/files/avoiding_bioenergy_competition_food_crops_land.pdf (accessed July 18, 2017); Richard Doornbosch and Ronald Steenblik, "Biofuels: Is the Cure Worse than the Disease?" Document SG/SD/RT(2007)3/REV1, prepared for Organization for Economic Co-operation and Development, Round Table on Sustainable Development, September 11–12, 2007, http://www.oecd.org/sd-roundtable/39411732.pdf (accessed July 18, 2017); and World Bank, "How Global Biofuel Expansion Could Affect the Economy, Environment and Food Supply," *Data & Research*, June 27, 2011, http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,contentMDK:22946809~pagePK:64165401~piPK:64165026~theSitePK:469372,00.html (accessed July 18, 2017).

[44]Colin A. Carter and K. Aleks Schaefer, "US Biofuels Policy, Global Food Prices, and International Trade Obligations," American Enterprise Institute *Economic Perspectives*, May 2015, https://www.aei.org/wp-content/uploads/2015/05/US-biofuels-policy.pdf (accessed July 18, 2017); David W. Kreutzer, "The Renewable Fuel Standard, Ethanol Use, and Corn Prices," Heritage Foundation *Backgrounder* No 2727, September 17, 2012, http://www.heritage.org/research/reports/2012/09/the-renewable-fuel-standard-ethanol-use-and-corn-prices.

[45]"[M]ost economists and market analysts…also are nearly universally agreed that the strong, steady growth in ethanol demand for corn has had an important and sustained upward price effect, not just on the price of corn, but in other agricultural markets including food, feed, fuel, and land." Schnepf, "Agriculture-Based Biofuels," p. 14.

[46]BusinessWire, "PwC Study: Renewable Fuel Standard Is Estimated to Cost Chain Restaurants Billions," November 28, 2012, http://www.businesswire.com/news/home/20121128005474/en/PwC-Study-Renewable-Fuel-Standard-Estimated-Cost (accessed July 19, 2017).

should not ignore the groups in rural America that have been hurt by the policies and subsidies. The federal government has supported corn and soybean growers at the expense of livestock producers and other crop producers and has diverted resources to an industry that is not self-sustaining. Furthermore, because of the RFS, fuel now competes indirectly with corn producers,[47] and this connection is not insignificant: Some 41 percent of the U.S. corn crop was dedicated to ethanol production in 2010–2012, compared to 14 percent when Congress mandated the original quota in 2005.[48]

Some small rural towns bet big on biofuels and lost. Utah State University's Institute of Political Economy details how preferential treatment for ethanol shifted the risk from companies to the local communities, where cities would offer incentives that in some instances lasted multiple decades or front the costs to build out the infrastructure. The report notes that:

> As demand for corn rose following the construction of these plants, both farmers and refineries felt an economic pinch. Ethanol refineries are reliant on low corn prices to generate profit, and experience losses during times of high corn prices. Following corn price spikes in 2008 and 2012, numerous corn ethanol plants went offline due to an inability to run profitably. While many believed that farmers were making off with huge profits, they too failed to gain substantially due to rising costs of input factors such as fertilizer. Heightened competition bolstered the price for land, driving tenant farmers out of business and contributing to what some called the "production treadmill." In all, the market structure of ethanol prevented farmers from realizing most of the intended benefit of the ethanol policies.[49]

Claiming that biofuels mandates and subsidies are an economic stimulus ignores the broken window fallacy. In his essay "That Is Seen, and That Which Is Not Seen," French economist Frederic Bastiat outlines a scenario in which a shopkeeper breaks a window.[50] The economic benefit is the money paid to fix the window, which circulates through the economy. What is not seen, however, is on what the shopkeeper could have spent his money, such as a new pair of shoes. If the window were not broken in the first place, the shopkeeper would have a window and new shoes. When the government subsidizes biofuels, what is not seen is that labor and capital could have been invested elsewhere in the economy. Private-sector investment that is not the result of regulations, subsidies, or mandates is the root of economic growth and genuine prosperity.

Ultimately, the biofuels policy has less to do with price or customer choice and much more to do with meeting a government quota regardless of costs. Although biofuel technologies may someday prove to be a preferred fuel choice, biofuels have proved to be expensive to produce and less energy dense than gasoline and diesel. Federal subsidies and mandates have shifted those costs to

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[47]U.S. Department of Agriculture Economic Research Service, "Bioenergy: Findings," http://www.ers.usda.gov/topics/farm-economy/bioenergy/findings.aspx (accessed July 18, 2017).
[48]Schnepf, "Agriculture-Based Biofuels," p. 9, and Carter, Rausser, and Smith, "Commodity Storage and the Market Effects of Biofuel Policies."
[49]Landon Stevens, Randy T Simmons, and Ryan M. Yonk, "Ethanol and the Renewable Fuel Standard," The Institute of Political Economy (IPE) at Utah State University, http://www.usu.edu/ipe/wp-content/uploads/2016/02/Ethanol.pdf (accessed July 18, 2017).
[50]Frederic Bastiat, "That Which Is Seen, and That Which Is Not Seen," July 1850, http://bastiat.org/en/twisatwins.html (accessed July 18, 2017).

motorists, the food industry, and sectors of the agriculture community that depend on corn and soy for feed, while benefits are concentrated among a select few.

Unintended Adverse Environmental Consequences. Policymakers sold biofuel programs and the RFS in part by promising several important benefits, including cleaner fuel and a reduction in the greenhouse gas emissions that allegedly contribute to climate change. Yet the ability of biofuels, particularly ethanol, to improve the environment and reduce greenhouse gas emissions—regardless of the benefits of such goals—has been unclear and controversial at best. According to the EIA, biofuel carbon-dioxide emissions are "considered to be part of the natural carbon cycle."[51] However, this assumption may be too broad. For example:

- After accounting for land-use conversion and the use of fertilizers, insecticides, and pesticides, as well as the fossil fuels used for production and distribution, biofuel production is quite carbon intensive.[52]
- The growing popularity of biofuel policies led the U.N.'s Food and Agriculture Organization (FAO) to focus on the issue in its 2008 *State of Food and Agriculture* report. Citing several studies published in *Science*, the FAO noted that converting non-cropland to the production of corn ethanol released at least 17 times more emissions than the amount that is cut in carbon-dioxide emissions by using biofuels, or a "carbon debt" of 48 years.[53]
- University of Michigan Energy Institute Professor Dr. John DeCicco finds that even without accounting for indirect changes in land use, biofuels increase the amount of carbon dioxide released into the atmosphere compared to regular gasoline.[54] University of Minnesota economists similarly found that the RFS, on net, increases greenhouse gas emissions and that "[o]nly the use of cellulosic biofuels with a carbon intensity 60% lower than that of gasoline reduces net GHG emissions."[55] Cellulosic ethanol is the least economically viable. A November 2016 Government Accountability Office report

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[51]U.S. Department of Energy, Energy Information Administration, "Emissions of Greenhouse Gases in the U.S.," March 31, 2011, http://www.eia.gov/environment/emissions/ghg_report/ghg_overview.cfm (accessed July 18, 2017).

[52]"Fundamentals of a Sustainable U.S. Biofuels Policy," Rice University, James A. Baker III Institute for Public Policy, *Policy Report* No. 43, January 2010, http://bakerinstitute.org/files/522/ (accessed July 18, 2017); Adam J. Liska, Haishun Yang, Maribeth Milner, Steve Goddard, Humberto Blanco-Canqui, Matthew P. Pelton, Xiao X. Fang, Haitao Zhu, and Andrew E. Suyker, "Biofuels from Crop Residue Can Reduce Soil Carbon and Increase CO_2 Emissions," *Nature Climate Change*, Vol. 4 (May 2014), pp. 398–401, http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1015&context=bseliska (accessed July 21, 2016).

[53]United Nations, Food and Agriculture Organization, *The State of Food and Agriculture: Biofuels: Prospects, Risks and Opportunities*, 2008, pp. 55–59, ftp://ftp.fao.org/docrep/fao/011/i0100e/i0100e.pdf (accessed July 18, 2017).

[54]John M. DeCicco, "Testimony on the Renewable Fuel Standard," before the Subcommittees on Interior and on Health Care, Benefits and Administrative Rules, Committee on Oversight and Government Reform, U.S. House of Representatives, 114th Cong., March 16, 2016, https://oversight.house.gov/wp-content/uploads/2016/03/2016-03-16-John-DeCicco-Testimony.pdf (accessed July 18, 2017).

[55]Jason Hill, LiailaTajibaeva, and Stephen Polasky, "Climate Consequences of Low-Carbon Fuels: The United States Renewable Fuel Standard," *Energy Policy*, Vol. 97 (2016), pp. 351–353, July 2016, http://www.sciencedirect.com/science/article/pii/S0301421516303962 (accessed July 18, 2017).

projects that the RFS is unlikely to meet its targets for reducing greenhouse gas emissions.[56]

- Despite once hailing biofuels as an important tool in mitigating climate change, the U.N.'s Intergovernmental Panel on Climate Change reversed positions and acknowledged in 2007 that biofuel policy negatively affects the lives of the poor, diverts land to the production of biofuels, has environmental consequences, and has dubious climate impacts.[57]

Meanwhile, Congress has seemingly ignored apparent increases in real pollutants attributed to the RFS. Land-use conversions can destroy wildlife habitat. Moreover, the EPA acknowledged that increased renewable fuel would result in higher emissions of air pollutants such as particulate matter and nitrogen oxides and stated that "[i]n addition to air quality, there are also expected to be adverse impacts on both water quality and quantity as the production of biofuels and their feedstocks increase."[58] A study by Iowa State University researchers concluded that incentivizing more biofuel production with government policies leads to more adverse environmental consequences caused by farming, the use of fertilizers, and land-use conversion for agricultural production, resulting in increased soil erosion, sedimentation, and nitrogen and phosphorous runoff into lakes and streams.[59]

The unwanted environmental costs of agricultural production are a solvable problem. Almost all industrial output results in unwanted byproducts, whether air pollutants or runoff and discharge from the use of fertilizers. These byproducts are not necessarily a reason to eliminate an activity; doing so could reverse hard-won prosperity and progress. The real problem is that biofuels have been sold to policymakers and the public as "green" fuels, whereas in practice, they can be more environmentally damaging than petroleum-based fuels.

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[56]U.S. Government Accountability Office, "Renewable Fuel Standard: Program Unlikely to Meet Its Targets for Reducing Greenhouse Gas Emissions," November 2016, http://www.gao.gov/assets/690/681252.pdf (accessed July 18, 2017).

[57]Intergovernmental Panel on Climate Change, Working Group II, *Climate Change 2014, Impacts, Adaptation, and Vulnerability*, IPCC WGII AR5, Final Draft, Chapter 13, "Livelihoods and Poverty," October 28, 2013, http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap13_FGDall.pdf (accessed July 18, 2017).

[58]U.S. Environmental Protection Agency, "Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program: Final Rule," *Federal Register,* Vol. 75, No. 58 (March 26, 2010), Part II, p. 14683, https://www.gpo.gov/fdsys/pkg/FR-2010-03-26/pdf/2010-3851.pdf (accessed July 18, 2017). Other studies have examined the impact of increased corn or cellulosic ethanol (independent of the mandate) on individual air pollutants like particulate matter or ozone. Jason Hill, Stephen Polasky, Erik Nelson, David Tilman, Hong Huo, Lindsay Ludwig, James Neumann, Haochi Zheng, and Diego Bonta, "Climate Change and Health Costs of Air Emissions from Biofuels and Gasoline," Proceedings of the National Academy of the Sciences, Vol. 106, No. 6 (February 10, 2009), http://www.pnas.org/content/106/6/2077.full.pdf+html (accessed July 18, 2017); and Diana L. Ginnebaugh and Mark Z. Jacobson, "Examining the Impacts of Ethanol (E85) Versus Gasoline Photochemical Production of Smog in a Fog Using Near Explicit Gas- and Aqueous-Chemistry Mechanisms," *Environmental Research Letters,* Vol. 7, No. 4 (November 6, 2012), http://iopscience.iop.org/article/10.1088/1748-9326/7/4/045901/pdf (accessed July 18, 2017).

[59]Amani Elobeid, Miguel Carriquiry, Jacinto F. Fabiosa, Kranti Mulik, Dermot J. Hayes, Bruce A. Babcock, Jerome Dumortier, and Francisco Rosas, "Greenhouse Gas and Nitrogen Fertilizer Scenarios for U.S. Agriculture and Global Biofuels," Iowa State University, Center for Agricultural and Rural Development *Working Paper* No. 11-WP 524, June 2011, http://ageconsearch.umn.edu/bitstream/107043/2/11-WP_524.Jun6Revise.pdf (accessed July 18, 2017).

The Folly of Central Planning

The Renewable Fuel Standard mandate demonstrates just how bad the government is at understanding what the market can bear in terms of production and consumption. As Austrian economist F. A. Hayek once said, "The curious task of economics is to demonstrate to men how little they know about what they imagine they can design."[60] No matter how brilliant or well-informed with data, politicians and bureaucrats cannot plan markets and consumer needs. Basic assumptions about the RFS have proven to be short-sighted, revealing the inability of government to plan energy markets.

The Blend Wall

As the RFS has reached the midpoint on the path to its final target in 2022, petroleum refiners have come up against what is known as the blend wall. Because overall gasoline consumption has leveled off as a result of a slower economy and increased fuel efficiency, and because the RFS mandates ever-increasing amounts of ethanol, continued compliance with the RFS would force refiners to blend more ethanol than the market will bear.

According to the RFS, each refiner in the United States has to meet a requirement that a certain percentage of domestic sales contain blended ethanol, called a renewable volume obligation (RVO).[61] Refiners have an option to meet part of their requirement by buying credits instead of blending more ethanol. In order to track the renewable fuel quotas, the EPA requires a 38-digit renewable identification number (RIN) to track the amount of biofuel reaching the market and to hold refiners accountable for blending enough ethanol. Refiners can either hold on to these credits and meet up to 20 percent of the RFS requirement in RIN credits or purchase RIN credits from other refiners when they fail to meet the requirement. Different RIN prices exist for different forms of biofuels.

The RIN trading system has resulted in numerous instances of fraud in which refineries bought fake credits with made-up RIN numbers for millions of dollars. Since refineries now face the blend wall, increased trading for RIN credits has driven up the price of the credit from pennies to over a dollar in 2013.[62] Bloomberg projects that overmandating (requiring the use of more ethanol than can be blended) and forcing the purchase of RINs could cost consumers an additional $13 billion at the pump—an artificial increase of 10 cents per gallon if RIN credit prices stay above one

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[60]Friedrich Hayek, *The Fatal Conceit: Errors of Socialism*, Vol. 1 of W. W. Bartley III, ed., *The Collected Works of Friedrich August Hayek* (London: Routledge, 1988), p. 76, http://www.libertarianismo.org/livros/fahtfc.pdf (accessed July 18, 2017).

[61]U.S. Department of Energy, Energy Information Administration, "RINs and RVOs Are Used to Implement the Renewable Fuel Standard," *Today in Energy*, June 3, 2013, http://www.eia.gov/todayinenergy/detail.cfm?id=11511 (accessed July 18, 2017).

[62]U.S. Department of Energy, Energy Information Administration, "What Caused the Run-Up in Ethanol RIN Prices During Early 2013?" *Today in Energy*, June 13, 2013, http://www.eia.gov/todayinenergy/detail.cfm?id=11671 (accessed July 18, 2017).

dollar.[63] But even if the price of RIN credits falls to 50 cents per credit, consumers will still be slapped with a multibillion-dollar bill.[64]

The economic consulting firm NERA warns that attempting to increase requirements to where the targets were set originally in the Energy Independence and Security Act of 2007 would result in intensified economic damage:

> When the required biofuel volume standards are too severe, as with the statute scenario, the market becomes disrupted because there are an insufficient number of RINs to allow compliance. "Forcing" additional volumes of biofuels into the market beyond those that would be "absorbed" by the market based on economics alone at the levels required by the statute scenario will result in severe economic harm.[65]

Higher economic growth, and therefore higher fuel consumption, could alleviate some blend wall concerns, but increased fuel-efficiency standards and higher volume targets for biofuels could cause the blend wall problem to persist. Flex-fuel vehicles capable of using E85 offer little economic relief for the blend wall. Demand for these vehicles is very low,[66] and drivers who own flex-fuel vehicles often fill their tanks with E10 as opposed to E85 because the energy content in E85 is lower. Adjusted for energy content, E10 makes more financial sense than E85.

Most important, no one knows what the future holds for economic growth and fuel consumption, which is why the government should not predict what markets will bear in 2022 with a law in 2005.

Market Problems with Advanced Biofuels

While corn-based ethanol production has outpaced the blend wall, the production of other biofuels to meet the RFS mandate has woefully underperformed.[67] The production of cellulosic ethanol, made from non-food sources, is nowhere near to meeting its targets, even though the RFS mandates that 16 billion gallons must be used by 2022. High capital costs and difficulty scaling up cellulosic biofuel conversion plants to meet large-scale demand have prevented non-food-sourced ethanol from being an economically viable option.

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[63]Bradley Olson and Dan Murtaugh, "Ethanol Upending Refiners Pushes $13 Billion on U.S. Drivers," Bloomberg, March 19, 2013, http://www.bloomberg.com/news/2013-03-18/refiners-pay-price-as-traders-hoard-ethanol-credits-valero-says.html (accessed July 18, 2017).

[64]For an up-to-date display of RIN prices and trading, see Progressive Fuels Limited, "PFL Weekly RIN Recap," http://www.progressivefuelslimited.com/web_data/PFL_RIN_Recap.pdf (accessed July 19, 2017).

[65]Nera Economic Consulting, "Economic Impacts Resulting from Implementation of the RFS2 Program," July 27, 2015, http://www.nera.com/content/dam/nera/publications/2015/NERA_FINAL_API_RFS2_July27.pdf (accessed July 18, 2017). Prepared for the American Petroleum Institute.

[66]U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Alternative Fuels Data Center, "Flexible Fuel Vehicles," last updated May 18, 2017, http://www.afdc.energy.gov/vehicles/flexible_fuel.html (accessed July 18, 2017).

[67]Purportedly, one of the reasons why Congress capped corn-based ethanol targets at 15 billion gallons annually was to address concerns that the mandate would divert corn used for fuel. Consequently, cellulosic biofuels were introduced into the mandate.

The EPA, which administers the RFS, has had to reduce Congress's original annual quotas for cellulosic ethanol every year since they were required by the mandate because not enough was available on the market. The EPA adjusted Congress's first cellulosic target down from 100 million gallons in 2010 to just 6.5 million. However, even the adjusted mandate was a stretch compared with reality: Zero gallons were produced that year and the following year.[68]

Consequently, refiners had to pay millions of dollars in waiver credits or surcharges for failing to comply with the EPA's minimum volume requirements, and they necessarily passed those costs on to the consumer. In January 2013, the DC Circuit Court of Appeals ruled that the EPA "let its aspirations for a self-fulfilling prophecy divert it from a neutral methodology" and that the target was an "unreasonable exercise of agency discretion."[69] The court vacated the cellulosic ethanol requirement required by the RFS for 2012. The EPA has since proposed cellulosic mandates for 2014–2016 that are equally as out of touch with market realities.

Private Benefits, Dispersed Costs. The strong lobbying of corn producers and the political importance of the geographic region where America produces corn make ethanol policy the perfect example of a focus on political profit as opposed to economic progress. They have been successful despite the unique and diverse mix of organizations opposed to the ethanol mandate.

The RFS essentially mandates a market for corn, soybeans, and biofuels that eliminates much of the risk of investing in biofuels—risk that every industry manages as a matter of doing business and that ultimately is necessary for a healthy and growing economy. Not only does it favor a select few commodities, but the mandate also benefits just a few states at the expense of the vast majority. Over 50 percent of ethanol production is concentrated in three states: Illinois, Iowa, and Nebraska.[70]

Ultimately, however, the benefits enjoyed by biofuel interests are limited and do not help the industry in the long run. The dependence on government to remain viable stunts the industry's long-term growth by propping up bioenergy and distorting the true price point at which biofuels will be competitive in the market.

Can the National Labs Be a Catalyst for Innovation?

The DOE national labs house exceptional staff, research, and facilities. The operating culture and business model of the national labs need to be transformed to engage more with the private sector. Increased access through contract agreements would unlock valuable research and resources for the private sector to develop advances in human knowledge and innovative technologies. It would also leverage private-sector investments to help maintain lab infrastructure.

However, both private-sector access to the labs' assets and research and lab employees' ability to turn research into market applications are stifled by complex and overly restrictive conflict-of-interest and intellectual-property-rights regulations. For example, current contract structures between labs and the private sector are rigid and complex, effectively discouraging private-sector

[68]U.S. Environmental Protection Agency, "Fuels Registration, Reporting, and Compliance Help."
[69]*American Petroleum Institute vs. Environmental Protection Agency*, 906 F.2d 729 (2013) [D.C. Circuit Court].
[70]Schnepf, "Agriculture-Based Biofuels," p. 18.

engagement. Draconian intellectual-property rules are still on the books in some labs, disincentivizing individuals with patents from working in related fields at a national lab.[71]

In order to increase access to national lab resources, Secretary Perry should:

- Enact rforms to increase lab autonomy;
- Restructure contractual work with the federal government, private sector, nonprofits, and universities;
- Examine alternative financing options for lab infrastructure use; and
- Establish a strong culture in the labs of active engagement with the private sector.

More independence and flexibility at the national labs will extend the value of research funding and infrastructure further. Furthermore, additional managerial and financial authority to the lab contractors would empower them to effectively manage capabilities and create a quicker process for collaborative efforts with third parties, whether with another government agency, another lab, or the private sector. Although these activities are occurring now, such cooperation should become part of the culture of the national labs rather than the occasional exception.

Improving the efficacy at the national labs does not, however, mean the labs should focus on energy-related research and development (R&D). The DOE should engage in R&D only when meeting a clear government objective and when the private sector is not already involved. Government objectives could, for instance, include research, development, and demonstration of technology to meet national security needs, support nuclear stockpile cleanup efforts, or advance human knowledge through basic research where the private sector is not engaged.

No matter how diligent or transparent an administration is, federal funding for R&D beyond these basic conditions will pick winners and losers among companies and technologies. Activities with the purpose of commercialization, regardless of where they lie on the technological development spectrum, are not legitimate functions of the federal government.

On the other hand, if there are legitimate reasons for the DOE to engage in research chemistry, physics, ecology, biology, and biogeochemistry for national security needs or for basic scientific exploration and discovery, reforming the national labs could serve as a catalyst for innovation.

Opportunities for Reform

[71]Matthew Stepp, Sean Pool, Nick Loris, and Jack Spencer, "Turning the Page: Reimagining the National Labs in the 21st Century Innovation Economy," The Information Technology and Innovation Foundation, The Center for American Progress, and The Heritage Foundation, June 2013, http://www2.itif.org/2013-turning-page-national-lab-executive-summary.pdf?_ga=1.238496128.1484445840.1442263666 (accessed July 18, 2017).

Longtime proponents of the ethanol mandate have come to recognize the problems of corn-based ethanol. In fact, several Members of Congress have introduced legislation to repeal only the corn requirement of the Renewable Fuel Standard.[72]
Removing corn's share of the requirement, perhaps the most economically viable part of the mandate, is problematic for several reasons. Biodiesel generated from soybeans presents the same food-for-fuel problem as the corn-ethanol mandate presents. Advanced biofuels from non-food-based sources are the least economically competitive of all such fuels and demonstrate just how incompetent the federal government is at centrally planning what the market can bear. And both the Renewable Fuel Standard and the federal government's promotion of biofuels create unintended environmental concerns.

To address the blend wall, legislative attempts have proposed to set the final ethanol mandate at no more than 9.7 percent of projected gasoline production. While a 9.7 (or 9.5 as some have proposed) percentage cap would be a step in the right direction, the reform ignores all of the other problems created by the RFS.

The fact that the EPA can use its own discretion to set biofuel targets after 2022 is all the more reason for Congress to act now.

Consequently, Congress should:

- **Repeal the mandate in its entirety and allow consumers a choice at the pump.** Biofuels existed long before the Renewable Fuel Standard and, if economically competitive, will remain long after it is gone. Removing the mandate would encourage a healthier market that promotes risk-taking and entrepreneurial activity rather than dependence on government for near-term survival through favorable policies and tax treatment. It is also important that policymakers not just repeal the corn-based part of the ethanol mandate and leave the least competitive part, the cellulosic requirement, intact.
- **Eliminate the bioenergy programs in the farm bill.** Congress should repeal all of the energy programs in the farm bill: Title IX as well as the Sun Grant program in Title VII.
- **Let producers drive alternative fuel innovation.** Use repeal of the mandate as momentum for greater reform in the energy sector. Such future reform should include a further leveling of the playing field for all energy companies and technologies. Congress should also remove preferential treatment for all transportation fuels and technologies.
- **Provide immediate expensing for capital investments.** Immediate expensing allows companies to deduct the cost of capital purchases at the time they occur rather than deducting that cost over many years based on cumbersome depreciation schedules. As part of broader tax reform that simplifies the code, immediate expensing should be made available for all capital investments.

[72]News release, "Toomey, Feinstein Introduce Bill to Repeal Ethanol Mandate," Office of Senator Pat Toomey, February 26, 2015, http://www.toomey.senate.gov/?p=news&id=1496 (accessed July 18, 2017).

- **Use the national labs as catalysts to innovation.** The role of the DOE should be to conduct the research to meet government objectives and create a system that allows the private sector, using private funds, to tap into that research and commercialize it. Federal labs should allow research to reach the market organically.

Conclusion

Favoritism toward biofuels and bioenergy has promised much but delivered very little. While a select few benefit from special treatment, bioenergy policies have come at significant cost to taxpayers, energy consumers, the environment, the world's hungriest citizens, and the large segment of the agricultural community that does not profit from the subsidies and Renewable Fuel Standard. Even if biofuels policies worked exactly as intended, Congress should still eliminate them as they pick winners and losers and mandate the production and consumption of one product over another. Eliminating preferential treatment of biofuels is one critical component of what should be a larger initiative to eliminate all transportation fuel and technology subsidies.

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