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Renewable Fuel Standard (RFS) Fact Sheet: Biofuels Mandate Fails Taxpayers & Increases Climate Costs

After decades of federal subsidies and a mandate for consumption, the biofuels industry has failed to deliver climate benefits. Worse yet, the evidence shows continued support will only further increase climate harms. Despite the industry's failures, agricultural producers, biofuels facilities, oil and gas companies, fueling stations, and others continue to reap taxpayer subsidies spread across several government agencies.

Biofuels have been falsely promoted as a way to help achieve U.S. energy independence, reduce greenhouse gas (GHG) emissions, and spur rural economic development. But the truth is the the Renewable Fuel Standard (RFS), the government policy that mandates biofuels (mostly corn ethanol and soy biodiesel) be blended with U.S. transportation fuel has saddled taxpayers with increased long-term liabilities and related costs while failing to deliver significant climate benefits.



A corn field ready for harvest in Nebraska

What is the Renewable Fuel Standard?

The biofuels industry enjoys a guaranteed market, mandated by the federal government, through what is known as the RFS. The federal mandate requires a certain level of ethanol and biodiesel be blended each year with gasoline and diesel.¹

The first RFS was established in the 2005 energy bill. It required 7.5 billion gallons (BG) of renewable fuels to be blended by 2012. In the 2007 energy bill, the Energy Independence and Security Act (EISA), the RFS was greatly expanded to require 36 BG of biofuels to be consumed by 2022, but the industry will fail to meet Congressional targets by 2022.

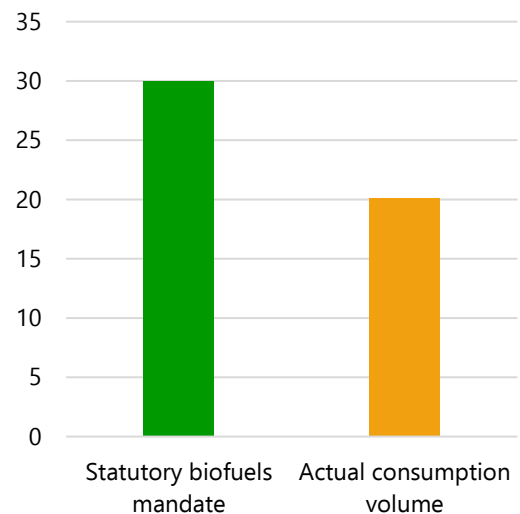
Despite the RFS requirement, actual biofuels consumption has been significantly lower than envisioned when the mandate was enacted primarily due to the failure of the advanced biofuels industry to produce large volumes of cellulosic biofuels derived from non-food crops and residues (see Figure 1). As a result, Congressionally-set mandates must regularly be lowered by the Environmental Protection Agency (EPA) because there is not enough advanced biofuels production to meet the intended goals.

Because of this, the RFS has primarily been filled with first-generation, food-based corn ethanol and soy biodiesel even though Congress envisioned an increasing portion of the federal mandate to be met with next-generation, non-food-based biofuels. Production of corn- and soy-based biofuels has soared since the RFS was first enacted. Using food and feed for fuel (specifically, 40 percent of the U.S. corn crop each year) has resulted in higher food and fuel prices, greater taxpayer and consumer costs, and more climate and environmental liabilities as carbon-rich grasslands and wetlands were covered into row crop production.²

Furthermore, most corn ethanol production was grandfathered into the RFS, meaning it was not required to meet even a minimum 20 percent GHG reduction threshold.³ Independent analysts found corn ethanol may actually *increase* GHG emissions,⁴ with questionable impacts for soy biodiesel as well.⁵ The National Academy of Sciences (NAS) thus concluded the RFS will fail to achieve its goals.⁶

The future of the RFS remains uncertain with statutorily required volumes ending in 2022, Renewable Volume Obligations (RVOs) not being finalized on-time in recent years, the RFS failing to meet its climate goals, and an impending shift to electric vehicles on the horizon.

Figure 1: 2020 RFS biofuels mandate vs. actual consumption volume, in billions of gallons



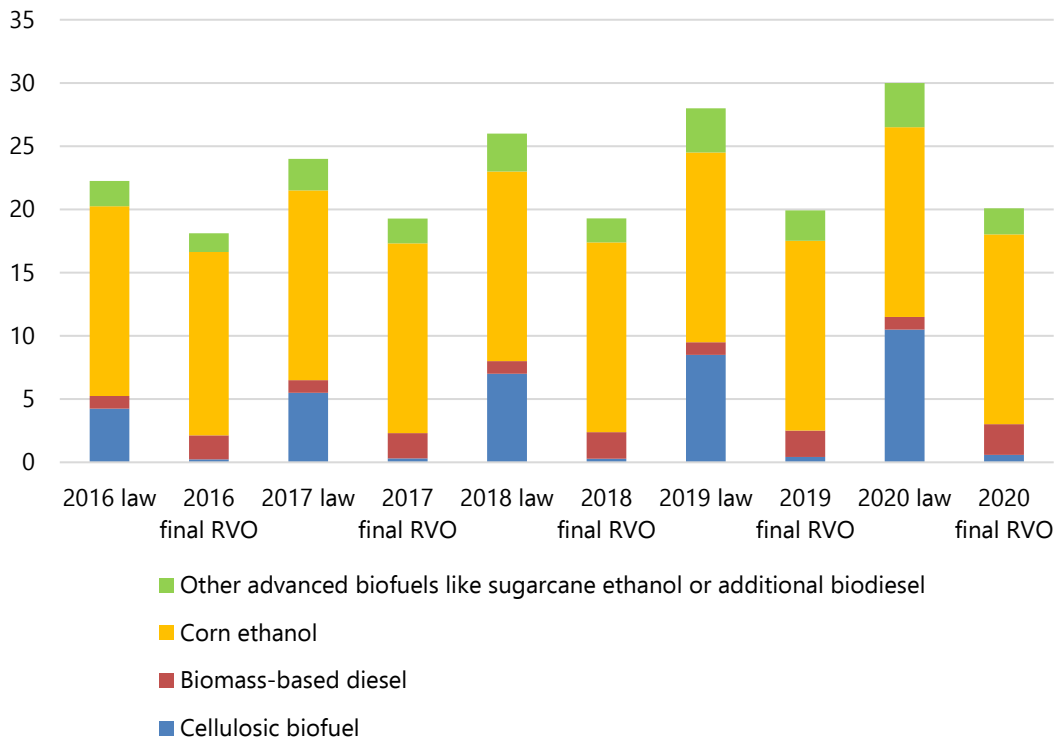
Current Status of the RFS

Even though the RFS requires high levels of biofuels volumes to be blended with gasoline and diesel, EPA has been forced to waive volumes down since 2014. As Table 1 shows, 2019 and 2020 volumes were roughly 30 percent lower than Congress envisioned (but note 2020 volumes are again under consideration at EPA due to the COVID-19 pandemic). The gap is largely due to lower cellulosic biofuels production than what was once projected. While cellulosic biofuels were expected to make up 35 percent of the RFS mandate in 2020, they likely instead comprised just three percent.⁷

Table 1: Total Gallons of Renewable Fuel that Must be Blended with U.S. Motor Fuel in the RFS			
Year	Billions of Gallons/Year Mandated by the RFS	Actual Volume in Billions of Gallons/Year, as Adjusted by EPA	% Decline
2010	12.95	12.95	0%
2011	13.95	13.95	0%
2012	15.2	15.2 ⁸	0%
2013	16.55	16.55 ⁹	0%
2014	18.15	16.28	10%
2015	20.50	16.93	17%
2016	22.25	18.11 ¹⁰	19%
2017	24	19.28	19.7%
2018	26	19.29	26%
2019	28	19.92	29%
2020	30	20.09 ¹¹	33%
2021	33	-	-
2022	36	-	-

Figure 2 (below) shows the specific discrepancies between Congressional mandates for biofuels consumption, as set by Congress, compared with revised volumes (known as final RVOs) that EPA waived down in recent years. Actual production of cellulosic biofuels has fallen significantly (95 percent) below Congressional mandates.¹² Meanwhile, since 2017, corn ethanol has easily reached its statutory mandate of 15 BG, and consumption of soy biodiesel (in the biomass-based diesel category) has increased as well.¹³

Figure 2: Corn Ethanol Dominates RFS While Other Biofuels Fail to Meet Targets, in billions of gallons



Definitions of Biofuels Mandated Under the RFS

The RFS specifies that two general categories of renewable fuels – conventional and advanced biofuels – be consumed in increasing amounts through 2022. Both must be produced from “renewable biomass”¹⁴ to qualify as RFS-approved feedstocks.

While Congress enacted protections for native grasslands, wetlands, and other sensitive acres in the 2007 energy bill, EPA failed to properly implement and enforce these regulations.¹⁵ This led millions of acres of wildlife habitat and other sensitive land to be converted into biofuel

Definition of “Renewable Biomass” in RFS

- ✓ Planted crops and crop residue harvested from agricultural (non-forested) land cleared or cultivated at any time prior to December 19, 2007 (in practice, primarily corn and soybeans)
- ✓ Planted trees and tree residue from actively managed tree plantations on non-federal land cleared at any time prior to December 19, 2007,
- ✓ Animal waste material and animal byproducts
- ✓ Slash and pre-commercial thinnings that are from non-federal forestlands, but not forests or forestlands that are ecological communities, old growth forests, or late successional forests
- ✓ Biomass obtained from the immediate vicinity of buildings and other areas regularly occupied by people, or of public infrastructure, at risk from wildfire
- ✓ Algae
- ✓ Separated yard waste or food waste, including recycled cooking and trap grease

feedstock production – primarily for corn and soybeans.¹⁶ This land conversion, driven by farmers responding to government mandates and subsidies, in addition to high crop prices around a decade ago also caused GHG emissions, water pollution, soil erosion, etc. to increase. These impacts were detailed in EPA’s own Triennial Report on the environmental impacts of the RFS, most recently in 2018 and acknowledged in a recent court case on the environmental impacts of the RFS.¹⁷

Table 2 distinguishes conventional biofuels from advanced biofuels in the RFS by comparing statutory definitions, volume requirements, and examples of each. Table 2 also specifies the percentage reduction in lifecycle GHG emissions each fuel must achieve to qualify as an RFS-approved biofuel, but note that several loopholes exist.

Table 2: Types of Biofuels Mandated in the RFS				
Type of Biofuel	Annual Production Mandate by 2022	Definition of Biofuel	Examples	Minimum Reduction in Greenhouse Gas (GHG) Emissions
Conventional biofuels	15 billion gallons/year	Ethanol derived from corn starch	- Corn starch ethanol	20%, but due to a grandfathering clause, nearly every ethanol facility was able to circumvent this minimal requirement
Advanced biofuels (subdivided into other categories – see advanced biofuels table definitions)	21 billion gallons/year	“Renewable fuel, other than ethanol derived from corn starch, that has lifecycle GHG that are at least 50% less than baseline GHG emissions”	<ul style="list-style-type: none"> - Cellulosic ethanol - Ethanol from non-corn feedstocks such as sugar - Ethanol from waste materials such as crop residues, food waste, animal waste, etc. - Biodiesel from soybeans, other vegetable oil, animal fats, etc. - Biogas from landfills - Butanol from renewable biomass such as corn (approved for a certain facility in MN - Gevo) 	50%

Table 3 further describes the three different categories making up the 21-billion-gallon “advanced biofuels” mandate (cellulosic biofuels, biomass-based diesel, and “other” advanced biofuels). Hence, the advanced biofuels mandate is sometimes referred to as a “nested” mandate. However, the targets Congress set in 2007 – primarily for cellulosic biofuels - have not been met.

Table 3: Types of Advanced Biofuels Mandated in the RFS				
Type of Biofuel	Annual Production Mandate by 2022	Definition of Biofuel	Examples	Minimum Reduction in Greenhouse Gas Emissions
Cellulosic ethanol	16 billion gallons/year	Renewable fuel derived from any cellulose, hemicellulose, or lignin	- Ethanol produced from agricultural residues (corn stover, for instance), forest residues, food or municipal solid waste, perennial grasses, etc. Corn kernel fiber cellulosic ethanol was also approved by EPA.	60%
Biomass-based diesel	At least 1 billion gallons/year, set annually by EPA	Biodiesel produced from vegetable oil or “a diesel fuel substitute produced from nonpetroleum renewable resources [including] animal wastes, including poultry fats and poultry wastes, and other waste materials, or municipal solid waste and sludges and oils derived from wastewater”	- Biodiesel produced from soybeans, corn oil, other vegetable oils, animal fats, used cooking oil, etc. - Other diesel fuel substitutes like renewable diesel produced from municipal solid waste, animal wastes, vegetable oil, etc.	50%
“Other” advanced biofuels	4 billion gallons/year	Any other fuel that meets the definition of an “advanced biofuel”	- Ethanol from non-corn feedstocks such as sugar - Butanol from renewable biomass (including butanol derived from corn, which was recently approved by EPA for a certain facility – Gevo) - May also include biomass-based diesel (see above)	50%

Long-Term Liabilities and Higher Taxpayer Costs of the RFS

While corn ethanol was once promised to be a “bridge” to advanced and cellulosic biofuels, it has failed to spur meaningful production of non-corn-based biofuels that have significant climate benefits. This is despite several decades of generous taxpayer subsidies and government mandates. And since the U.S. hit the 10 percent ethanol (E10) “blend wall,” or the maximum amount of ethanol that can safely be blended into the current vehicle fleet (without harming older vehicles or small engines), cellulosic ethanol had little room to grow in the marketplace. A shift to electric vehicles and declining gasoline consumption nationwide further narrowed ethanol’s market expansion potential. The biofuels industry is now calling for additional biofuel tax credits, aviation biofuel subsidies, and more despite new fuels likely requiring the use of status quo, food-based feedstocks.

Special interest supports for corn ethanol and other food-based biofuels have spurred numerous unintended consequences and long-term liabilities and costs for both consumers and taxpayers while distorting the marketplace. Just some of these costs for consumers and taxpayers include the following:

- Greater costs for ethanol infrastructure** since ethanol is more corrosive than gasoline and hence incompatible with certain older storage tanks and fueling infrastructure. Taxpayers subsidize ethanol blender pumps through a federal tax credit, in addition to historic and current infrastructure subsidies through two U.S. Department of Agriculture (USDA) programs and funding accounts. In 2015, \$100 million in blender pump subsidies was distributed through the Biofuels Infrastructure Partnership and a related program (for another \$100 million) was announced in early 2020, entitled the Higher Blends Infrastructure Incentive Program (HBIIIP).¹⁸ A third round of \$100 million was announced in Dec. 2021. From 2011-2014, USDA also subsidized ethanol blender pumps through the existing Rural Energy for America Program (REAP) even though the program was meant to primarily promote rural wind, solar, and hydropower projects. While the 2014 farm bill prohibited the use of REAP subsidies for ethanol infrastructure, USDA continued to circumvent Congressional intent by creating new subsidies through the Commodity Credit Corporation (CCC), a funding account normally reserved for dispensing agriculture subsidies.
- Higher food¹⁹ and feed costs**, particularly for the poor in the U.S. and developing countries, since most RFS biofuel gallons are derived from food and feed crops such as corn, soybeans, and sugar.²⁰ The U.S. sends a large portion of its corn and soybean crops to biofuels facilities each year. These market distortions impact crop and food prices, particularly during years with supply shocks, such as the 2012 drought. In addition, international vegetable oil prices influenced by biofuel crops being diverted to fuel instead of food/feed has corresponding impacts on deforestation and the loss of carbon-rich land in other countries.
- Higher fuel costs for consumers** since biofuels are not always cost-competitive with gasoline and diesel. EPA estimated that if proposed 2021 and 2022 biofuels volumes are finalized, fuel costs would increase by \$2.3 billion.²¹ The Congressional Budget Office (CBO) also estimated in 2014 that if RFS biofuels production volumes continued on auto-

pilot (except for cellulosic ethanol since production levels are so low), the price of E10 - the primary gasoline blend in the U.S. - would increase 13-26 cents per gallon, and the price of diesel would jump 30-51 cents per gallon.²²

- **Higher – instead of lower - GHG emissions** since the mandate has primarily been filled with corn ethanol, a biofuel that was largely exempt from RFS requirements to reduce GHG emissions.²³ Converting soybeans into biodiesel and woody biomass into biofuels may also negatively impact the climate.²⁴ EPA's own analysis found higher RFS volumes increase GHG emissions, not to mention analyses from other independent experts.²⁵
- **Higher costs to replace small engines and older vehicles** that cannot run on higher ethanol blends such as 15 percent ethanol (E15).²⁶
- **Loss of wildlife habitat, more water pollution (and water treatment costs, loss of recreation revenue, etc.),** and public health costs as sensitive land – highly erodible acres, wetlands, and grasslands – are converted into corn and soybean production.²⁷ In particular, corn production uses more inputs (such as nitrogen fertilizer and pesticides) than other crops, which contributes to water pollution when pollutants run off into nearby waterways and eventually the Gulf of Mexico.
- **The RFS also undermines other federal policies** aimed at reducing environmental liabilities associated with climate change and water pollution, just to name a few. As an example, mandates that pick winners and losers and promote corn ethanol production encourage more corn plantings on carbon-rich, sensitive land while U.S. Department of Agriculture (USDA) conservation programs pay farmers to retire or conserve this same land. These types of programs contradict one another, wasting taxpayer dollars.

Future of the RFS

After nearly 20 years of federal biofuels mandates and decades of government subsidies, the U.S. has little to show for taxpayers' investment. The corn ethanol industry has failed to create a bridge to advanced biofuels. First-generation, food-based biofuels such as corn ethanol and soy biodiesel make up a large majority of the RFS mandate despite their negative climate impacts, and future production of biofuels – for aviation, for instance - may rely on the same status quo feedstocks.

Instead of rolling subsidies back and limiting the federal government's role in the biofuels market, the Administration and certain members of Congress continue to seek ways to increase duplicative subsidies for biofuels. Some recent policy changes – and new proposals - include the following:

- **COVID-19 pandemic:** The Dec. 2020 Consolidated Appropriations Act opened the door to subsidies for biofuel producers impacted by the COVID-19 pandemic, to the tune of \$700 million.²⁸
- **Tax extenders:** Congress extended the \$3 billion per year, \$1/gallon biodiesel tax credit through 2022, not to mention other tax breaks for cellulosic biofuels production, biofuels infrastructure projects, and others through the end of 2021 as well.²⁹ The budget reconciliation package – Build Back Better – would have extended these credits and eventually shifted them into similar "clean fuel" tax credits after 2026.

- **Aviation biofuels:** The President’s FY22 budget request, reconciliation bill, and other legislative proposals would have created a new tax credit for aviation biofuels, up to \$1.75 per gallon. Cost estimates ranged from \$1 billion to \$7 billion, but costs could rise even further if production ramped up significantly in the future.

The RFS is currently at a turning point. Statutory volumes end in 2022, and EPA has more authority beginning in 2023 to set biofuels volumes unless Congress steps in beforehand. EPA is also required to “reset” future biofuels volumes in the RFS due to advanced biofuels not keeping up with mandates set by Congress, in addition to the mandate failing to achieve its goals.

Recommendations

The RFS has done more harm than good. The mandate has failed to mitigate climate risks while increasing food and fuel costs, distorting markets, and increasing long-term liabilities. Meanwhile, federal subsidies, tax credits, loan guarantees, and other supports for biofuels have wasted taxpayer dollars on the mature corn ethanol and soy biodiesel industries. Instead of picking winners and losers through mandates, the tax code, and other federal programs, the government should allow the biofuels industry to compete on a level playing field without market distortions. Taxpayers deserve real climate solutions instead of more special interest subsidies that do nothing to reduce GHG emissions. After four full decades of biofuels supports, it’s about time the industry stood on its own two feet.

For more information, please visit <https://www.taxpayer.net/category/agriculture/>

- ¹ <http://www.fas.org/sgp/crs/misc/R40155.pdf>, <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2019-and-biomass-based-diesel-volume>
- ² <https://news.wisc.edu/plowing-prairies-for-grains-biofuel-crops-replace-grasslands-nationwide/>
- ³ <https://www.epa.gov/sites/production/files/2015-08/documents/420r10006.pdf>
- ⁴ <http://www.gao.gov/assets/690/681252.pdf>
- ⁵ <https://www.actu-environnement.com/media/pdf/news-26709-etude-te-biodiesel.pdf>
- ⁶ <https://www.nap.edu/catalog/13105/renewable-fuel-standard-potential-economic-and-environmental-effects-of-us>
- ⁷ <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2020-and-biomass-based-diesel-volume>
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- ⁹ <https://www.gpo.gov/fdsys/pkg/FR-2013-08-15/pdf/2013-19557.pdf>
- ¹⁰ <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2014-2015-and-2016-and-biomass-based>
- ¹¹ <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2020-and-biomass-based-diesel-volume>
- ¹² <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2019-and-biomass-based-diesel-volume>, <http://www.fas.org/sgp/crs/misc/R40155.pdf>, <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2020-and-biomass-based-diesel-volume>
- ¹³ <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2017-and-biomass-based-diesel-volume>, <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2020-and-biomass-based-diesel-volume>, <https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2019-and-biomass-based-diesel-volume>
- ¹⁴ 42 U.S. Code § 7545(o)(1)(I).
- ¹⁵ http://www.nwf.org/~media/PDFs/wildlife/farm%20%20bill/RFS_factsheet_v1_10-11-13.pdf
- ¹⁶ <http://iopscience.iop.org/article/10.1088/1748-9326/10/4/044003/pdf>, <https://iopscience.iop.org/article/10.1088/1748-9326/aa6446>
- ¹⁷ https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=341491&Lab=IO, <https://earthjustice.org/news/press/2021/d-c-circuit-rules-in-earthjustice-case-challenging-epas-2019-renewable-fuel-volumes>
- ¹⁸ <https://www.rd.usda.gov/hbiip>
- ¹⁹ <https://www.ers.usda.gov/topics/farm-economy/bioenergy/findings/>
- ²⁰ <https://www.epa.gov/renewable-fuel-standard-program/approved-pathways-renewable-fuel>
- ²¹ <https://www.epa.gov/sites/default/files/2021-12/documents/420d21002.pdf>
- ²² <https://www.cbo.gov/publication/45477>
- ²³ <http://www.catf.us/resources/whitepapers/files/20130405-CATF%20White%20Paper-Corn%20GHG%20Emissions%20Under%20Various%20RFS%20Scenarios.pdf>
- ²⁴ https://ec.europa.eu/energy/sites/ener/files/documents/Final%20Report_GLOBIOM_publication.pdf
- ²⁵ <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P1013KOG.pdf>
- ²⁶ <http://www.gao.gov/new.items/d07713.pdf>
- ²⁷ <http://www.nwf.org/News-and-Magazines/Media-Center/News-by-Topic/General-NWF/2017/3-21-17-New-Study-Links-Habitat-Destruction-to-Ethanol-Production.aspx>
- ²⁸ <https://www.fischer.senate.gov/public/index.cfm/2021/6/usda-announces-700-million-in-covid-relief-for-biofuels-producers>
- ²⁹ <https://www.jct.gov/CMSPages/GetFile.aspx?guid=d4ba73c5-07f3-4353-b863-e3a32d7d7e03>, <https://ethanolrfa.org/tax/>