



Issue Brief

Requests to Waive the Renewable Fuel Standard in the Aftermath of the 2012 Heat Wave and Drought September 20, 2012

In the wake of the devastating heat wave and drought which covered much of the United States this year, it has become clear that there will be less corn available on the market for the remainder of the year and for much of 2013 than there had been in recent years. Livestock, poultry, and ethanol producers already have been hit especially hard by the sharp increase in the price of corn, because corn comprises such a large portion of their production costs. Many livestock and poultry producers have had to liquidate herds and flocks as pastures and forage crops withered, and a number of ethanol producers have had to shut down or curtail production at plants. Further effects will be rippling through the U.S. and global economy in the months ahead.

The question of who will have to cut back on corn consumption in the year ahead has become as much a political question as it is an issue for the market to resolve. [Several governors from livestock and poultry producing states](#), with [support from the meat, poultry, and food processing industries](#), are calling on the Administrator of the Environmental Protection Agency (EPA) to waive some or all of the Renewable Fuel Standard (RFS) for the remainder of 2012 and 2013. Since most renewable fuel today is made from corn, they argue that waiving the RFS would reduce demand for corn significantly, thereby making more available at lower prices for meat and poultry producers and food processors. This in turn, they submit, would benefit consumers who otherwise will face much higher food prices in the months ahead. They say the RFS creates an inflexible demand for corn that is not responsive to higher prices, and that it thus forces meat and poultry producers, food processors, and consumers to bear a disproportionate share of the cost of the extreme weather and a short crop.

However, these issues are much more complex than often portrayed. This issue brief explores some of the questions relating to the impacts of the heat wave and drought on corn and ethanol production, what the RFS entails, and the potential impacts of an RFS waiver on various national priorities.

[How much damage did the heat wave and drought cause to the corn crop this year?](#)

We will not know until the 2012 harvest is complete just how big a toll this summer's extreme weather had on the nation's corn crop. Corn is the nation's largest and most valuable crop, valued at more than \$76 billion in 2011, [according to the National Corn Growers Association \(NCGA\)](#). In September, the [U.S. Department of Agriculture \(USDA\)](#) estimated that this year's corn crop will be about 13 percent lower than in 2011 – about 10.7 billion bushels compared to 12.4 billion bushels in 2011. Although the 2012 harvest likely will be the eighth largest in U.S. history, it is certain to fall far short of the 14.7 billion bushels that were expected earlier this year - before the drought set in.

As the extreme weather intensified, the price of corn jumped more than 65 percent between early June and late August, from around \$5.10 per bushel to as high as \$8.39. The price has since come down to \$7.40 (September 18). During the same period, ethanol prices increased about 34 percent, from around \$2.00 per gallon to about \$2.67, before settling down to \$2.28 (September 18).

What will be the economic impact of the extreme weather?

It is difficult to precisely measure the economic toll of a disaster like this. However, this event likely will rank among the most costly natural disasters in the nation's history. The 1988 drought was estimated to have [cost about \\$86 billion](#) (2006 dollars). The damage from Hurricane Katrina in 2005 reached a similar scale. At the peak of this year's extreme weather, 33 states and more than half the nation's counties were affected by drought, [according to the USDA](#).

Much of the damage has already been done to crops, herds, and flocks. Most of the nation's corn, soybean, hay, and cattle are produced within the affected region. The region also supplies much of the feed for livestock and poultry producers outside of the drought zone. Many herds and flocks have had to be liquidated for lack of affordable feed and forage. Many corn ethanol production plants have shut down or scaled back production due to the lack of corn or poor profit margins.

The [USDA Economic Research Service \(ERS\)](#) estimates that food prices will increase in the months ahead at a higher than normal rate. Overall food inflation for 2012 may be between 2.5 and 3.5 percent, and, for 2013, the rate may be between 3.0 and 4.0 percent.

How is the U.S. corn crop used?

The primary use – more than 60 percent – of the U.S. corn crop is for animal feed. In 2011, this included 36.3 percent which went directly for animal feed; the equivalent of another 12.2 percent in the form of dried distillers grains (DDGs) (a high protein, animal feed co-product of ethanol production); and about 13.0 percent in exports to other countries primarily for animal feed. In addition, a net of about 27.3 percent of the crop was used for ethanol production (after subtracting the DDGs). About 4.1 percent was used to produce high fructose corn syrup. And the remaining 7.1 percent was used for processed food (such as corn starch, corn oil, cereal, and corn meal), bio-based products, seed, and carry-over stocks, [according to the NCGA, based on USDA data](#).

What does the Renewable Fuel Standard (RFS) require?

Congress expanded the RFS in 2007 as part of the [Energy Independence and Security Act of 2007](#) (P.L. 110-140) to reduce oil imports faster, to stimulate rural economic development, and to reduce climate-changing carbon emissions from transportation fuels. The statute requires a total of 36 billion gallons of renewable biofuel to be blended into the nation's fuel supply annually by 2022, of which at least 21 billion gallons must be "advanced biofuels" (i.e., not made from cornstarch). Advanced biofuels in 2022 must include a minimum of one billion gallons per year of biomass-based diesel and 16 billion gallons per year of biofuel made from cellulosic biomass.

The production and consumption life cycle of advanced biofuels must emit at least 50 percent fewer greenhouse gas (GHG) emissions than petroleum-based fuels; cellulosic biofuels must emit at least 60 percent fewer GHG

emissions; and corn ethanol from new ethanol plants must emit at least 20 percent fewer GHG emissions on a life-cycle basis.

The RFS allows up to 15 billion gallons per year of ethanol to be made from cornstarch. For 2012, the statute would require blending up to 13.2 billion gallons of corn ethanol with gasoline, and in 2013, it would require blending up to 13.8 billion gallons – plus much smaller amounts of advanced biofuels.

Why so much corn ethanol in the RFS?

Unlike advanced, next generation biofuels, first generation corn ethanol was already beginning to be produced at commercial scale before 2005 when the first RFS was enacted as part of the [Energy Policy Act of 2005](#) (P.L. 109-58). By 2003, a number of petroleum refiners had begun to switch to corn ethanol both as an octane enhancer (to replace lead) and as a substitute for [Methyl Tertiary Butyl Ether \(MTBE\)](#). MTBE is a fuel additive (oxygenate) that was being used in reformulated gasoline to meet air quality standards. However, MTBE was subsequently found to be infiltrating groundwater and polluting drinking water supplies, making the water undrinkable. Many states subsequently banned it. Corn ethanol provided one of the lowest cost alternatives to MTBE, with proven technology and ample corn supplies at low prices.

When the RFS was expanded in 2007, Congress assumed that corn ethanol would be the primary biofuel that refiners would use for the first several years. Advanced biofuels were expected to come later, as new technologies, biomass crops, and production systems were developed. Building out the corn ethanol industry, infrastructure, and markets would prepare the way for the introduction of the new, more environmentally sustainable and more climate-friendly advanced biofuels.

What authority does the Environmental Protection Agency (EPA) have?

The [EPA is responsible for implementing the RFS](#) and has the authority to adjust the minimum renewable fuel blending requirements (set by Congress) as needed from year to year based on its assessment of the capacity of the industry, the economy, and agricultural and biomass producers to meet the requirement. The EPA Administrator [also has the authority](#) to temporarily alter or waive the biofuel mandates in the event that implementation cause significant economic or environmental harm to a state or region.

How much corn would it take to meet the 2013 RFS?

The starch from one bushel of corn produces about 2.8 gallons of ethanol, [according to the NCGA](#). Thus, it will take about 4.9 billion bushels to meet the 2013 RFS requirement of 13.8 billion gallons. However, after the starch is removed from the corn at the ethanol plant, about 30 percent of the remaining corn (i.e., the protein, oil, and fiber) is returned to the animal feed supply in the form of DDGs. So, the net amount needed to meet the 2013 RFS requirement is actually about 3.4 billion bushels. This amount would constitute about 32 percent of the anticipated 2012 harvest of 10.7 billion bushels – not the “40 percent” that is so often quoted in the news. Had the 2012 corn harvest been as large as planned (14.7 billion bushels), the net portion going to ethanol in 2013 would have been only about 23 percent.

Is the corn ethanol industry responding to higher corn prices without an RFS waiver?

Yes, it is. As corn prices soared in July and August, many plants shut down or reduced production for lack of corn or due to shrinking profit margins. By late August, ethanol production had already dropped more than 13 percent since the beginning of June due to a combination of rising corn prices and low fuel demand, according to the [Energy Information Administration \(EIA\)](#). Furthermore, during July and August, the industry began to draw down its large inventory of ethanol ([over 19 million barrels](#)). Using existing inventory instead of producing more ethanol would reduce corn demand by more than 250 million bushels.

By September, as the corn harvest got underway and the price of corn began to fall (down 12 percent from the August high, as of September 18), more ethanol plants have resumed operations, and ethanol production has increased modestly, according to the EIA.

Does the RFS provide any flexibility to refiners in years such as this when there is a short crop?

Yes, it does. The EPA allows refiners to apply [surplus blending credits](#) earned in previous years (up to 20 percent of the amount blended in a given year) to future years in lieu of the blending requirement. Refiners currently have about [2.5 billion gallons worth](#) of renewable fuel blending credits which they can carry over and apply against the RFS requirements in 2012 or 2013. If they used blending credits instead of purchasing more ethanol, it would reduce corn demand by more than 850 million bushels. In addition, refiners have the flexibility to defer blending ethanol in one calendar year to the following year, [according to the EPA](#).

Furthermore, reduced ethanol exports and increased imports are other ways that the global ethanol market is responding to higher corn prices in the United States. This also would result in reduced demand for corn. These trends were already occurring during the first half of the year – before corn prices spiked – and continued into September, [according to the EIA](#).

Would an RFS waiver reduce corn prices in time to help struggling livestock and poultry producers?

Recent analyses from [Iowa State University](#) and [Purdue University](#) indicate that under certain conditions, an RFS waiver may reduce corn prices over time. However, an RFS waiver may not result in reductions in corn prices that are as large or immediate as livestock and poultry producers and food processors would like.

Iowa State's Bruce Babcock finds that corn prices would fall about \$0.58 per bushel (i.e., dropping from an anticipated high price of \$7.82 down to \$7.24) with a complete EPA waiver of the RFS requirements in 2013, compared to corn prices in a scenario in which a) the EPA does not issue a waiver, and b) blenders use 2.4 billion gallons of renewable fuel blending credits to meet the RFS requirement instead of producing more ethanol.

Purdue's Wallace Tyner, Farzad Taheripour, and Chris Hurt find that the following factors need to be in place for an RFS waiver to make the most difference for reducing ethanol demand: a) high corn prices, b) low oil prices, and c) refiners having maximum regulatory and technical flexibility to stop blending ethanol. In the most extreme scenario they examined, the EPA would waive the RFS by 25 percent (3.45 billion gallons), and in addition, blenders would apply 2.6 billion gallons of renewable fuel blending credits to reduce ethanol production in 2013. They estimate that the price of corn may fall anywhere from \$0.00 to \$1.31 per bushel (i.e., dropping from an

anticipated high price of \$7.89 down to \$6.58) below what the price would have been in a scenario in which a) the EPA does not issue a waiver, and b) blenders applied two billion gallons worth of renewable fuel credits to meet the RFS requirement instead of producing more ethanol.

However, as they explain, there are many reasons why refiners may not want to or be able to reduce ethanol blending in the short term. Ethanol has been fully integrated into fuel formulas and fuel production systems to meet both EPA air quality requirements and industry fuel performance standards. Many refiners may not have the flexibility to reduce ethanol blending in the short term, and it may be costly for some to change their fuel blending in the long term.

Both studies point out that much depends on the price of gasoline, which has risen significantly in recent months, [according to the EIA](#). Currently, ethanol futures, which are selling for about \$2.40 per gallon, are cheaper than gasoline futures, which are selling for around \$3.00 per gallon. Until these prices converge, refiners will not have much incentive to reduce their demand for ethanol – even with a waiver.

What would be some economic costs of an RFS waiver?

An RFS waiver may compound and redistribute economic harm, rather than easing it. If refiners actually reduce ethanol blending, then a waiver would likely compound the harm that has already been done to livestock and poultry producers by extending further harm to the ethanol industry (i.e., by causing more ethanol plants to close, more people to be laid off, and more harm to rural communities where plants are based).

What would be the effect of an RFS waiver on fuel prices, fuel imports, and energy security?

An ethanol waiver would likely cause higher prices at the gas pump for consumers and businesses and reduced energy security. Ethanol today displaces about 10 percent of the gasoline supply (by volume). In 2011, ethanol helped reduce the price consumers paid for gasoline at the pump by about \$1.00 per gallon on average nationally, below what the price would have been for gasoline without ethanol, [according to economists at Iowa State](#).

The portion of ethanol use that would be waived would need to be replaced with more petroleum-based gasoline, presumably imported. This would put additional upward pressure on global oil prices at a time when [prices have already been rising](#) due to other factors. Higher pump prices would likely offset much of any savings to consumers from the reduced food inflation that might result from a waiver. Further, more oil imports – at higher prices - would add to the U.S. trade deficit. In 2011, the United States' net petroleum import deficit was more than \$326 billion, or more than 58 percent of the total trade deficit in goods and services, [according to the Department of Commerce](#).

The net result of the waiver (if refiners reduced their use of ethanol) would be increased dependence on imported oil, for which supply, demand, and prices are determined largely by market participants beyond U.S. shores. Consumers, businesses, and the national economy would become more vulnerable to the threats and costs of global supply disruptions and rising global demand.

How would an RFS waiver effect the commercialization of advanced next generation biofuels?

An RFS waiver would likely send a negative signal to potential investors in next generation biofuels. Moving beyond corn ethanol is a critical goal of the RFS. Other biomass feedstocks offer far greater bioenergy potential than corn – producing much more biofuel per acre; using less energy and other inputs; and causing less harm to the climate and the environment. These more sustainable, climate-friendly [advanced biofuels are already being produced](#) in limited quantities today, but many more biorefiners hope to have shovels in the ground soon.

The [USDA estimates](#) that, in order to meet the RFS advanced biofuel requirement in 2022, the United States will need to build more than 500 new biorefineries, each producing about 40 million gallons per year. Each will need to develop local sustainable biomass supply chains to collect, harvest, transport, store, and process large volumes of biomass. It could cost as much as \$168 billion to build all of these biorefineries. Thus, lots of new investment is needed now if the 2022 goal is to be met.

This is a critical time for many would-be advanced biofuel producers who are now trying to line up financing to build new commercial scale biorefineries and biomass production systems. Unfortunately, policy uncertainty about the government's future commitment to the RFS is [one of the biggest obstacles to growth and investment](#) in the industry today – compounding the already existing uncertainties about the future of the broader economy. Is the United States truly committed to reducing its oil dependence and pursuing an advanced biofuel future? Investors want to know.

Concluding thoughts about the RFS and the waiver request

The RFS was created to address urgent and important national concerns. Oil dependence poses a significant threat to U.S. economic, energy, climate, and environmental security. Based upon mounting empirical evidence, [climate scientists](#) are increasingly recognizing that the extreme weather events observed with escalating frequency in the United States and around the world in recent years are connected to climate change and the use of oil and other fossil fuels. Military leaders have identified both [oil dependence](#) and [climate change](#) as significant threats to U.S. and international security. Even the [U.S. Department of Defense \(DoD\)](#) has found that its continued dependence on oil has created a significant strategic vulnerability in its ability to carry out its mission. As a result, DoD itself is moving aggressively to develop next generation biofuels for aviation and marine fuels. In sum, the United States must move quickly to dramatically reduce this dependence.

Renewable biofuels can help. [According to researchers at the Energy Biosciences Institute of the University of California, Berkeley](#), the United States has the potential to meet 30 percent or more of its entire liquid transportation fuel needs with domestically produced biofuels – several times more than the United States produces today.

The Renewable Fuel Standard is helping get the United States started. Since it was first enacted in 2005 and strengthened in 2007, the RFS has:

- helped reduce U.S. dependence on oil imports by [displacing about ten percent of the gasoline supply \(by volume\)](#) and about two percent of diesel fuel with renewable biofuels,
- helped reduce the impact of global oil price spikes for American consumers and [reduce the cost of transportation fuels](#) below what it would have been otherwise,
- [created more than 100,000 direct, new jobs](#) in the biofuels industry (plus hundreds of thousands of additional new jobs indirectly),

- started to shift the U.S. transportation system away from its dependence on climate-polluting fossil fuels toward more sustainable, renewable biofuels, and
- created a new emerging advanced biofuels industry, which will use more sustainable and more climate-friendly biomass.

However, the United States still has a long way to go to end its dangerous and unhealthy dependence on petroleum. Oil dependence continues to accelerate harmful climate change, threatening the well being of current and future generations, to wreak havoc with the U.S. economy and household budgets, and to expose the U.S. and global economy to threats of supply disruptions due to armed conflicts and civil unrest. Producing more oil domestically will not change the fact that the U.S. petroleum market is tied to the global petroleum market where supply, demand, and prices are determined largely by others beyond U.S. shores.

The United States can do much more to reduce oil dependence. Increased fuel economy standards ([which the Obama Administration has just announced](#)), accelerated development and use of affordable electric vehicles (with renewable power), and the expansion of public and alternative transportation options will all make a very significant difference as they are phased in over the next decade. The RFS will continue to help, too. With continued implementation, the RFS could help replace as much as 25 percent of the nation's gasoline supply with renewable biofuels by 2022 – if the U.S. government maintains its commitment.

The United States certainly can do corn better and do better than corn. Federal policies should be strengthened to encourage farmers to produce corn more sustainably (much progress has been made already, but much more is needed) and to accelerate the development and use of much more sustainable and climate-friendly biomass resources and biofuels. Now is not the time to pause and send cutting-edge technology innovators and private investors fleeing from this promising, more sustainable, low carbon future. Continued strong federal policy support for the RFS will help assure that these critical national priorities are brought to fruition.

Waiving the RFS now would bring uncertain and less significant benefits in the short term while likely imposing much more certain and significant environmental and economic costs in the long term.

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