

April 2014

The Renewable Fuel Standard (RFS) and America's future: An analysis of the potential impacts of major RFS policy alternatives on U.S. Hispanics

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Abstract

The Renewable Fuel Standard (RFS) was established and calibrated during the mid-2000s as a means to stimulate the growth of domestically-produced and renewable alternatives to petroleum-derived transportation fuels. Given recent large-scale shifts of both global energy markets and the population demographics of the United States, it is time for policymakers to re-evaluate the current RFS' suitability for meeting long-term U.S. energy policy goals, and its sustainability in promoting equitable outcomes for a diversifying population. This paper explores three major policy alternatives introduced in the 113th Congress to amend the current RFS, and assesses these bills' projected impacts on Hispanics, the fastest growing demographic group in the United States. This analysis reveals that U.S. Hispanics do not share in the vast economic and employment benefits from the growth of a national biofuels industry that is centered in rural areas of the Midwest, and are also disproportionately impacted by RFS-induced increases in food prices. All three policy alternatives discussed in this paper would reduce the disparate impacts of current RFS policy on Hispanics, however, in doing so, they also threaten to reduce the universal, nationwide benefits the RFS has stimulated in the form of augmented national security and fuel price stability.

As such, we suggest a hybrid solution to create an effective, equitable, and sustainable RFS to guide future renewable fuel development and use in the United States.

Introduction

The Renewable Fuel Standard (hereafter, "RFS") was established by the Energy Policy Act (EPA) of 2005 and later expanded under the Energy Independence and Security Act (EISA) of 2007 (Bracmort 2013, Schnepf 2013). The RFS was conceived by policymakers as a tool to reduce the demand for transportation fuels derived from foreign oil by stimulating the production of domestic biofuels that could be mixed with or replace gasoline at a time when foreign imports and prices were at or near all-time highs (Bracmort 2013). Biofuels utilized for transportation are most commonly liquids such as ethanol or biodiesel, and are derived from processing biomass - organic matter that may include plant materials, wood and paper waste, animal manure, municipal solid waste, algae, and food waste (Schnepf 2013). Ethanol, the most widely available, can be produced from any organic matter containing sugars or any material that can be converted to sugars (Schnepf 2013). The RFS mandates the annual minimum volumes of biofuels across four nested categories that must be incorporated into the nation's transporta-

tion fuel supply and is administered by the Environmental Protection Agency (EPA) (Schnepf & Yacobucci 2013). The biofuel categories include total renewable fuels, advanced renewable fuels, cellulosic biofuel, and biomass-based biodiesel (Schnepf & Yacobucci 2013).

To meet the 2007 EISA requirements for renewable fuel, biofuels must meet specified reductions in lifecycle greenhouse gas (GHG) emissions relative to the 2005 baseline average of gasoline or diesel fuel it replaces (Schnepf & Yacobucci 2013). Lifecycle GHG emissions assessments undertaken by EPA consider all sources of direct and indirect emissions, including as a result of potentially significant land-use changes, related to feedstock and fuel production and use (Schnepf 2013). Lifecycle GHG reduction thresholds are also used to define biofuel categories under the RFS (Schnepf & Yacobucci 2013). To qualify as a renewable fuel, a biofuel must achieve a 20% lifecycle GHG emission reduction. Advanced biofuels and biomass-based diesels must achieve 50% lifecycle GHG emission reductions while cellulosic biofuels must meet or exceed 60% reductions (Schnepf & Yacobucci 2013).

Currently, the vast majority of biofuel produced in the United States is ethanol made from corn starch (DOE 2011). Corn starch

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ethanol qualifies as a renewable biofuel, just meeting the 20% lifecycle GHG emissions reduction standard. Advanced biofuels, meanwhile, may be made from other food crops like sugarcane, as well as some grains depending on the methods used to process the ethanol, or in the case of cellulosic biofuels, from non-edible crops like perennial grasses, harvest and wood waste, municipal solid wastes, or yard and food wastes (e.g., Bracmort et al. 2011, Bracmort 2013, Schnepf & Yacobucci 2013). These cellulosic biofuels have not been proven economical in large-scale production in comparison to corn-starch ethanol (Bracmort et al. 2011, Bracmort 2013), but may hold tremendous promise especially for the development of a waste-derived ethanol industry. In the future, industrial and municipal waste products may be able to be sorted and processed for the production of ethanol near the urban areas where the wastes were produced and the ethanol will be sold, reducing transportation and storage costs and related technological hurdles that limit the growth of the ethanol industry outside the Corn Belt.

RFS Successes and Challenges

Overall, the RFS has been quite successful in reducing foreign oil imports and creating demand for biofuel alternatives but limited in price benefits. Biofuels now account for nearly 10% of the nation's transportation fuel supply, and are predicted to displace the need for some 13.6 billion gallons of petroleum-based fuels by 2022 (EPA 2010). This increased use of biofuels, combined with lowered national demand for oil, and increased domestic production of shale oil, has reduced foreign imports greatly since the RFS was established less than a decade ago (EIA 2011). With regards to shielding consumers from rising and unstable prices, economists generally agree that there are consumer price benefits for

blending ethanol into gasoline, but there are large disparities in opinion regarding the size of the benefit to consumers. Findings from multiple studies over the last six years range from \$0.17 to \$1.09 per gallon in savings as compared to unblended gasoline for specific, individual years over that period (RFA 2013). Meanwhile, the U.S. Environmental Protection Agency projects that by 2022 the RFS will only be responsible for a reduction in gasoline prices of about \$0.03 per gallon (EPA 2010).

Yet, the rapid success of the RFS overall has led to several unanticipated problems involving the potential economic and ethical considerations surrounding the large-scale diversion of corn and other crops from the food supply to create fuel (Schnepf 2013). Even as the acreage devoted to corn and the productivity of the national corn crop has increased over the last few decades, the share of corn used for ethanol production has climbed rapidly, from 6% in 2000 before the RFS to 40% in 2012 (Schnepf 2013, Schnepf & Yacobucci 2013). The increased demand for corn and other agricultural products by ethanol producers has coincided with a major increase in the price of these commodities (Condon et al. 2013, Schnepf 2013). The EPA estimates that the RFS will contribute to a \$10 per capita increase in food costs by 2022, owing mainly to corn prices (EPA 2010). In particular, the USDA projects corn prices to remain about double their 1997-2006 levels through 2020 (USDA 2013). These market effects have also shifted economic incentives for farmers, leading to major concerns over resultant changes in grain and livestock production, fertilizer and pesticide inputs, and land-use that may exacerbate environmental and water quality concerns (Schnepf & Yacobucci 2013). Corn-based ethanol production also impacts the market for natural gas, a key input for the production of corn and ethanol (Schnepf & Yacobucci 2013).

Yet another problem involves the technological limitations of the nation's transportation fleet and infrastructure to handle ethanol biofuel blend levels above 10%, a level often referred to as the "blend wall" because of the various legal and technological hurdles limiting the widespread distribution of blends of greater ethanol concentration (Schnepf 2013). Many of the technological hurdles are caused by the physical properties of ethanol which may degrade or damage gasoline delivery infrastructure and standard automobile engines (Schnepf 2013). Meanwhile, the blend wall is also upheld by a patchwork of state laws and legal liability from limited vehicle warranties (Schnepf 2013).

Energy independence, economic development, environmental impacts, and technological limitations are among the most important issues for policymakers and economists to understand as they seek to evaluate whether the RFS's positive direct effects on American national security and the national energy portfolio outweigh other diffuse, but potentially significant, negative effects. Another potential consideration for policymakers is that the benefits and costs of the RFS are not equally distributed across the nation's population owing to geographic differences in the production and use of ethanol and other renewable fuels, and income and spending differences amongst different racial and ethnic groups in the United States.

Hispanics and the RFS

Hispanics in the United States are more likely to be impacted negatively rather than positively by the RFS relative to the average American in terms of economic prospects and fuel and food prices. While Hispanics in the U.S. now number 53 million (US Census Bureau 2013)—

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approximately 17% of the nation's total population—Hispanics primarily live in the American Southwest and along the Eastern Seaboard (Brown & Lopez 2013), and were almost twice as likely to live in an urban environment than non-Hispanics in 2003 (Timmins 2006). Meanwhile, the benefits of the RFS are highly concentrated in the rural Midwest where farmers are capitalizing on high corn and land prices (Schnepf 2013), and where the major ethanol producers and distributors are based (Schnepf 2013). Just in terms of gasoline prices, one analysis demonstrated that the effects of ethanol blending on wholesale gas pricing resulted in an additional savings of \$0.25 and \$0.22 per gallon averaged over the last decade in the Midwest relative to the East and West Coasts, respectively (Du & Hayes 2012).

Fuel and food prices, both affected by the RFS, also disproportionately affect Hispanics negatively because of Hispanics' relatively lower earnings. In 2011, the median household incomes of foreign-born and native-born Hispanics were \$35,900 and \$42,400, respectively, while the U.S. average was \$50,000 (Motel & Patten 2013). From 1980-2003, Hispanics spent a greater share of their income on food than non-Hispanics (20% compared to 16.9%) including spending about 18% more in real dollars (Timmins 2006). Over this same period, Hispanics spent about 5.5% of their total expenditures on transportation fuels, slightly more than non-Hispanics (Timmins 2006). However, non-Hispanics averaged 12.3% more in real dollars on transportation fuels in this period (Timmins 2006); thus, the pressure to hold down oil and gas prices is driven by non-Hispanics even though transportation fuels consume a greater share of the incomes of Hispanics. While Hispanics benefit slightly from any decreased fuel costs as a result of the RFS, the concomitant rise in food

prices associated with this energy-based policy costs Hispanics more in total dollars and as a share of their incomes.

These disproportionate impacts on Hispanics by the RFS have not received much attention thus far, but should, especially as Congress debates a full range of important modifications to meet the program's immediate and future challenges. There have been a number of bills in the 113th Congress proposed to amend the RFS including The Leave Ethanol Volumes at Existing Levels (LEVEL) Act (H.R. 1469), the Renewable Fuel Standard Amendments Act (H.R. 1482), and the Renewable Fuel Standard Elimination Act (H.R. 1461). The LEVEL Act proposed by Rep. Mike Burgess (R-TX) would limit the expansion of RFS biofuel mandates and lock-in the 10% blend wall (CRS 2013a). Rep. Steve Womak's (R-AR) RFS Amendments Act would also reduce the biofuel mandate while requiring all biofuel to meet advanced biofuel standards beginning in 2014 (CRS 2013b). Finally, the RFS Elimination Act, as proposed by Rep. Bob Goodlatte (R-VA) would repeal the RFS program altogether (CRS 2013c). This paper explores these three major policy alternatives to current RFS rules and assesses these bills' projected impacts on Hispanics in the U.S.

Leave Ethanol Volumes at Existing Levels (LEVEL) Act

The LEVEL Act proposes substantive changes to the RFS primarily by redefining renewable fuel and significantly reducing the mandated volumes of renewable fuel blended into the nation's transportation fuel supply (CRS 2013a). In redefining renewable fuel, the LEVEL Act would essentially rescind the new definitions of renewable fuels that were instituted under 2007 EISA; specifically, the Act revokes the 20% reduction in lifecycle GHG emis-

sions threshold and allows for the inclusion of waste-derived ethanol (CRS 2013a). The RFS would be set annually at 7.5 billion gallons of renewable fuel. This level is equivalent to the final year of the original RFS biofuel mandate in the 2005 EPAct, and would represent a 59% reduction for 2014 and a 79% reduction for 2022 in the RFS biofuel mandate established under EISA in 2007.

To support the development of cellululosic and waste-derived biofuels after dissolving the nested categories of biofuel mandates currently instituted in the RFS, the LEVEL Act would recognize 1 gallon of these advanced biofuel types as 2.5 gallons of renewable fuel. Meanwhile, the LEVEL Act would also prohibit the introduction into commerce of any ethanol-gasoline blend greater than 10% ethanol (E10) and rescinds recent EPA waivers granting the distribution of ethanol-gasoline blends up to 15% ethanol (E15). The bill would require EPA to thoroughly study effects of higher ethanol-gasoline blends on consumer products, the impact of these higher blends on engine performance, emissions, and consumer safety, as well as the ability of gasoline distribution infrastructure to introduce these blends into commerce with minimal misfueling by consumers.

Projected LEVEL Act Impacts

Given that any ethanol would become an eligible renewable fuel to satisfy a greatly reduced mandate, corn-based ethanol would likely come to dominate the renewable fuels market share in the short term even more than under the current RFS policy. Over the longer term, the greatly reduced mandate would slacken the demand for corn used to produce ethanol. As a result, many of the worst consequences of the high demand on corn for energy

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production would be lessened, including environmental and water quality issues, agricultural land use and animal feedstock issues, and upward pressure on food prices. However, weaker demand for corn might also greatly reduce corn prices, yielding cheaper corn ethanol prices. While this might have a slight impact on gas prices for consumers, it would also undermine advanced biofuel technologies. The 2.5x equivalency credit incentive in the LEVEL Act issued for the blending of cellulosic and waste-derived ethanol into gasoline by distributors may not be enough to offset the cheaper corn ethanol that may also result from the law's passage.

The low mandate level for biofuels mixed into the transportation fuel supply in the LEVEL Act virtually assures that the blend wall will not be an issue for U.S. consumers until 2023 at the earliest. In fact, if current U.S. gasoline demand remains flat, the volume of ethanol in the fuel supply would decrease from right around the 10% blend wall under current law in 2013 to approximately 5% or less under the LEVEL Act. Nonetheless, some corn ethanol in excess of the RFS mandate may still be produced and incorporated into the fuel supply but this would vary highly with the price of oil. This bill would also commission the study of the benefits and consequences of expanding the blend wall so that policy options beyond 2022 can be properly investigated, leaving the potential for future industry growth. It is also important to note that the EPA has certified that passenger vehicles manufactured in 2001 or later can accept E15. By the time the LEVEL Act would expire, the vast majority of vehicles on U.S. roadways would have been manufactured after 2001; thus, the blend wall might be passively expanded to 15% by 2023.

Overall, by reducing the volume of ethanol in the fuel supply and concomitantly increasing the demand for gasoline, the LEVEL Act would likely increase fuel prices and may increase fuel price instability by increasing the proportion of oil-derived fuel in the marketplace. One study suggests that each billion gallon increase in demand for gasoline would increase gas prices by nearly \$0.06 per gallon (Marzoughi & Kennedy 2012); this could mean an increase of as much as \$0.61 per gallon in 2014 as a direct result of the lowered mandate (from 18.15 to 7.5 bgal). The LEVEL Act, however, might also eliminate some of the upward pressure on corn and food prices, at least in part. As a result, the LEVEL Act relieves much of the disparate impacts that current RFS policy imposes on Hispanics in the U.S both in terms of food prices and reducing the gas savings gap between the Midwest and the Coasts even as gas costs rise.

Perhaps most significantly though, the LEVEL Act would also take a major step to developing ethanol production near the major metropolitan centers producing usable waste. Because these metropolitan areas are also where the majority of Hispanics live, there are a number of potentially large benefits to developing waste-derived ethanol industries in these communities including new jobs and higher incomes, municipal savings through reduced disposal costs, and potentially healthier and cleaner urban environments. However, the low, flat cap on the biofuels mandate in the LEVEL Act may serve to disincentivize the development of a waste-derived ethanol industry that could boost Hispanic jobs and incomes in much the same way that corn ethanol has done for rural residents of the Midwestern states.

Renewable Fuel Standard (RFS) Amendments Act

Like the LEVEL Act, the RFS Amendments Act would also decrease the RFS mandate and eliminate the separate nested biofuels category limits. RFS Amendments Act renewable fuel mandate levels would be reduced from 18.15 to 3.75 billion gallons in 2014 alone, and by 15 billion gallons from 2007 EISA levels in each of the years from 2015 to 2022 (CRS 2013b). The RFS Amendments Act also redefines renewable fuel; however, rather than weakening the definition of renewable fuel as under the LEVEL Act, this bill would require all renewable fuel after January 1, 2014, to meet the advanced biofuel requirements of the 2007 EISA (CRS 2013b). As a result, all corn-based ethanol would be excluded from qualifying under the new RFS.

RFS Amendments Act Impacts

In mandating that all biofuels meet advanced biofuel criteria, the RFS Amendments Act would likely result in substantial pressure by ethanol refineries to move away from low GHG lifecycle emission feedstocks and processes such as those involved in corn ethanol production to meet the RFS mandate. Instead, ethanol made from other food crops including sugarcane, rye, and barley, and nonfood crops like switchgrass and winter cover crops, may qualify depending on EPA analyses of their GHG lifecycle emissions. Thus, the relative value of crops may shift, and with it shifts in crop production and associated land use changes. Because of the outsized influence of corn in the American diet, the decrease in corn prices resultant from reduced corn demand should outweigh any concomitant increases in other agricultural commodities, providing at least some decrease in food prices relative to current conditions under RFS policy.

Depending on the strength of demand for Brazilian sugarcane ethanol, the RFS Amendments Act could also encourage the development of new and more economical advanced biofuels, including cellulosic biofuels.

Because of the greater mandate reductions, the effect of the RFS Amendments Act on fuel prices is likely greater than that of the Level Act; the 2014 mandate reduction (14.4 bgal relative to current policy) could result in gas prices rising by as much as \$0.82 per gallon (based on the findings of Marzoughi & Kennedy (2012)), \$0.21 greater than the estimate for the LEVEL Act. This bill would likely also increase gas price volatility even more so than the LEVEL Act because of the smaller initial mandate in the short term (and increased reliance on petroleum-based fuels). Additionally, this bill could result in a strong demand for imported Brazilian sugarcane ethanol as a cheaper, abundant source of advanced biofuel to meet the new biofuels mandate. This outcome could sacrifice some of the national security and price stability benefits of current RFS policy.

By incorporating a rising RFS mandate, the RFS Amendments Act would allow for the expansion of the biofuels industry in a way not fostered by the LEVEL Act. Depending on the strength of demand for Brazilian sugarcane ethanol, the RFS Amendments Act could also encourage the development of new and more economical advanced biofuels, including cellulosic biofuels. Unfortunately, there is no explicit carve-out for cellulosic or waste-derived biofuels as in the LEVEL Act. On the other hand, blend wall issues would likely be put off until 2020 based on the RFS Amendments Act mandate schedule, and might be alleviated entirely pending new engine technologies and manufacturer certifications already approved by EPA.

Much like the LEVEL Act, the RFS Amendments Act provides some relief from the disparate impacts of current RFS policy on Hispanics in the U.S. While fuel prices would likely rise significantly because of less insulation from global oil prices,

increased gasoline demand, and the imported ethanol costs, food prices should return to close to pre-RFS levels. Even given Hispanics' larger proportion of income directed towards food rather than fuel (nearly 4x larger), this policy change is not likely to be a net benefit to Hispanics, however, it would reduce the disparity in benefits between groups within the U.S. This bill would also favor advanced biofuel technologies developed in rural areas over those in metropolitan areas because of the lack of recognition for waste-derived ethanol, so there is less future upside for U.S. Hispanics in terms of potential industry growth, increasing jobs, and rising incomes.

Renewable Fuel Standard Elimination Act

The RFS Elimination Act would repeal Section 211(o) of the Clean Air Act (42 U.S.C. 7545(o)) (CRS 2013c). This section of the U.S. Code houses the EPA's entire renewable fuel program including the RFS mandate. The authors of the bill likely view it as a vehicle to limit government intervention within, and distortion, of domestic energy markets, and limit the reach and rulemaking authority of the Environmental Protection Agency.

RFS Elimination Act Impacts

The RFS Elimination Act would presumably result in the reduction of most national security and fuel price stability benefits that have resulted from the imposition of the RFS mandate. Meanwhile, food prices mostly should return to pre-RFS levels, although there might be a short term wholesale disruption of agricultural commodities as farmers adjust to new policy incentives. With no incentive for the production of advanced biofuels and the need to incorporate an

oxygenate into gasoline (given MTBE's ban in most states (see Schnepf 2013), some corn would still be diverted to the fuel supply to make ethanol. The effect of this policy on fuel prices would depend on the voluntary demand for ethanol as an oxygenate, but the need to replace 18.15 bgal of ethanol in 2014 with gasoline could increase gas prices by as much as \$1.03 per gallon (once again, based on the findings of Marzoughi & Kennedy (2012)). As a result of the RFS Elimination Act, the disproportionate effects of the RFS would be eliminated, but so too would the overall national benefits and the potential for a growing biofuels industry to enhance rural economies, as well as create new opportunities for Hispanics and other groups concentrated in metropolitan and urban areas in the future.

Conclusions

With a rapidly growing share of the U.S. population and the electorate (Taylor et al. 2012), Hispanics are receiving increasing attention from the media and politicians as a powerful constituency (e.g., Frey 2008, Loyka 2011, Maestas 2012, Warren 2012). However, policymakers have generally been slow to evaluate how legislation that isn't popularly perceived as being particularly salient to Hispanics (i.e., issues other than immigration, trade with Latin America, Latin American foreign policy, etc.) would actually impact this constituency of growing electoral importance. In fact, according to national exit polling, none of these issues even made the top three most important issues for Hispanic voters; Hispanics in the 2012 election instead listed the economy (60%), health care (18%), and the federal budget deficit (11%) as their main concerns (Lopez & Taylor 2012). In the case of the RFS, U.S. Hispanics have been disproportionately impacted by increasing food prices (and

All three bills differ, however, in the extent to which they equalize benefits and costs among Hispanics and non-Hispanics, as well as the extent to which they preserve or expand the national benefits the RFS has stimulated.

have benefitted less from slightly reduced fuel costs) because of income and expenditure differences relative to other groups. Hispanics in the U.S., while enjoying the same national benefits of this policy in terms of national security and fuel price stability, do not share in the vast economic benefits (greater gas price savings and employment opportunities) from the growth of a biofuels industry that is centered in rural areas of the Midwest.

The three policy alternatives under consideration in the 113th Congress discussed in this paper would all reduce the disparate impacts of current RFS policy on Hispanics relative to other groups in the United States but could also increase costs for all groups. All three bills differ, however, in the extent to which they equalize benefits and costs among Hispanics and non-Hispanics, as well as the extent to which they preserve or expand the national benefits the RFS has stimulated.

The Renewable Fuel Standard Elimination Act (H.R. 1461) would represent the most effective policy option for eradicating the disproportionate impacts of the RFS on U.S. Hispanics; yet, this bill would also eliminate all of the national benefits associated with the RFS. Instead, both the Leave Ethanol Volumes at Existing Levels (LEVEL) Act (H.R. 1469) and the Renewable Fuel Standard Amendments Act (H.R. 1482) would reduce the disproportionate impacts of the RFS on Hispanics in the U.S., while preserving at least some of the national benefits of the RFS. The RFS Amendments Act could succeed in further transitioning the U.S. biofuels industry to advanced biofuels (though with little upside specifically for Hispanics), but may also encourage increased reliance on foreign sources of qualifying fuels (i.e., Brazilian sugarcane ethanol). In contrast, the LEVEL Act could generate huge opportu-

nities for Hispanics in terms of jobs and income by helping launch waste-derived ethanol industries centered in metropolitan areas of the United States, but only if waste-derived ethanol is able to become economically competitive with corn ethanol production.

Overall, incorporating the rising mandate caps from the RFS Amendments Act into the framework of the LEVEL Act and mandating some proportion of that mandated volume be from advanced biofuels (similar to current policy) could yield an optimal policy for U.S. Hispanics. Under such a policy, the disparate impacts between Hispanics and non-Hispanics would be greatly reduced from the current RFS while the national security and fuel price stability benefits would largely be preserved. Additionally, the inclusion of waste-derived ethanol into the RFS and the increasing demand generated from rising annual advanced biofuel mandates could generate new biofuels industries in the areas where Hispanics live, contributing to a wide variety of biofuel industry benefits including rising wages, and increased direct and indirect job opportunities that are currently concentrated in largely non-Hispanic regions of the country.

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