RENEWABLE FUELS ASSOCIATION

House Energy and Commerce Committee
Subcommittee on Energy and Power
United States House of Representatives

Hearing on
Overview of the Renewable Fuel Standard: Stakeholder Perspectives

Testimony of

Bob Dinneen
President & CEO, Renewable Fuels Association

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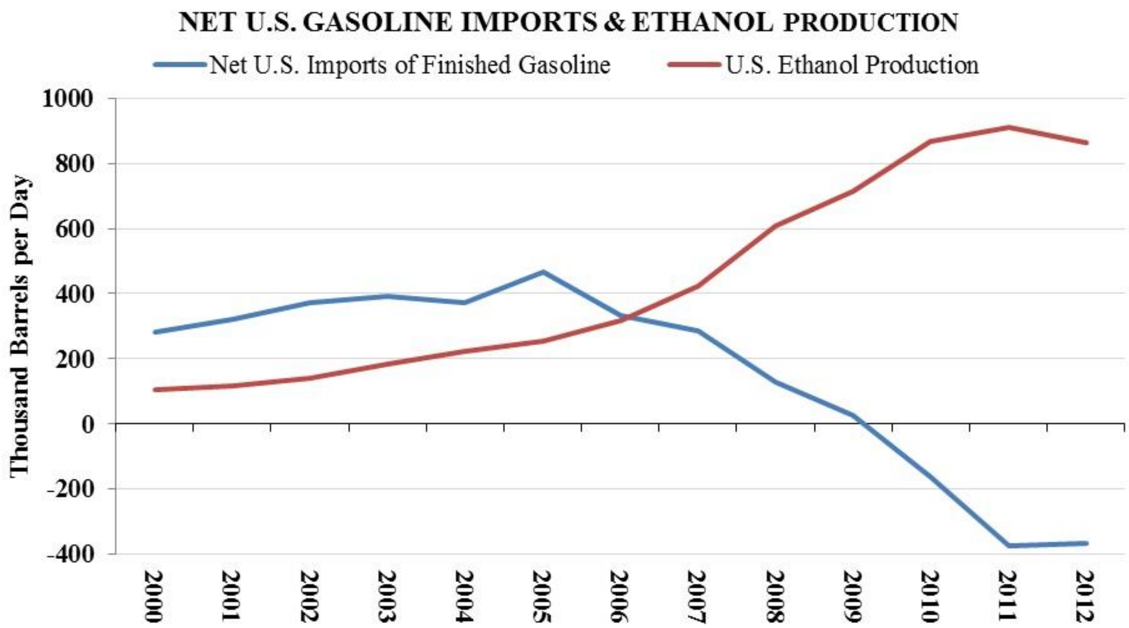
Good morning, Chairman Whitfield, Ranking Member Rush, and Members of the Subcommittee. My name is Bob Dinneen and I am president and CEO of the Renewable Fuels Association (RFA), the national trade association representing the U.S. ethanol industry.

The RFA is the leading trade association for America's ethanol industry. Its mission is to advance the development, production, and use of fuel ethanol by strengthening America's ethanol industry and raising awareness about the benefits of renewable fuels. Founded in 1981, RFA's 300-plus producer and associate members are working to help America become cleaner, safer, energy independent and economically secure.

By virtually any measure, the Renewable Fuel Standard (RFS) has been an unmitigated success. It has reduced our dependence on imported petroleum, stimulated investment in new technologies, reduced consumer gasoline prices, created jobs and economic opportunity across rural America, saved taxpayer dollars by lowering farm program payments, and is the only program we have that lowers greenhouse gas emissions from transportation fuels. While the oil industry would like to re-litigate the RFS today because its continued implementation will mean a further loss of market share, doing so would devastate investments that have been made in next generation biofuels technologies and stop the evolution of the transportation fuels market just as it is getting started. It is important to note that Congress did an excellent job of crafting the RFS, building in a great deal of administrative and market flexibility to deal with issues as they arise. As a result, there is nothing wrong with the RFS that cannot be fixed with what is right with the RFS, and there is NO need to legislate changes to a program that is working well today.

The RFS is Enhancing U.S. Energy Security and Diversity:

U.S. dependence on imported oil and petroleum products has fallen since the RFS was enacted. According to Energy Information Administration (EIA) data, the share of U.S. petroleum consumption represented by imports has fallen steadily from 60% in 2005 to 40% today. It is important to note that this measure includes net imports of both crude oil *and* all other petroleum products. If just crude oil is considered, import dependence was 57% in 2012, meaning that the most significant reduction has been in petroleum products, i.e., finished gasoline. While several factors are responsible for the decrease in petroleum import dependence in recent years, the rapid emergence of ethanol production under the RFS stands out as a particularly important catalyst, largely eliminating the need for imported finished gasoline. Indeed, EIA cites "increased use of domestic biofuels (ethanol and biodiesel)" as a major driver behind the decrease in petroleum import dependence.[1] In fact, cumulative new ethanol production since 2005 has accounted for 62% of new domestically-produced liquid fuels, while cumulative new U.S. crude oil production has accounted for 38%.



While increased domestic oil production from fracking has also been a factor in reducing petroleum import dependence from 2005 levels, its role has been exaggerated by oil and gas proponents. Oil production from fracking is a relatively recent phenomenon, and U.S. oil production was actually declining steadily until 2009. Further, the scale of technically recoverable crude oil from U.S. shale resources needs to be placed in context. The 4.3 billion barrels of technically recoverable tight oil from the Bakken shale play (as estimated by the U.S. Geological Survey) is less than one year's worth of crude oil consumption by U.S. refineries (U.S. refiner input of crude oil was 5.5 billion barrels in 2012).

In any case, the recent boom in tight oil production from fracking doesn't change the fact that fossil fuels are finite and exhaustible. The fracking boom has simply delayed the inevitable. Referring to the recent developments in U.S. unconventional oil production, a recent paper published in *Energy Policy* concluded:

> However important these developments are, they do not change the central argument of Peak Oil…Rather than continuing to argue for or against the topic, Peak Oil should be acknowledged as part of a complex energy situation with the realization that cheap fuel is no longer available and we now face circumstances where prices will increase and high energy-

[1] http://www.eia.gov/energy_in_brief/article/foreign_oil_dependence.cfm

> based growth will be limited. With this acceptance, and while there still is sufficient oil, <u>*there should be investment in new energy source*s</u> (emphasis added).[2]

One new energy source — ethanol — is already making a difference. Because of the RFS, ethanol already accounts for 10% of the nation's gasoline supply. Because of the RFS, ethanol displaced the need for the amount of gasoline refined from 462 million barrels of imported crude oil in 2012.[3] Because of the RFS, the biofuels industry stands ready to contribute substantially more to our nation's energy and economic security.

Ethanol and the RFS are Helping to Lower Consumer Gasoline Prices:

Several analyses in recent years have estimated the impacts of increased ethanol blending on wholesale and/or retail gasoline prices. While the published estimates of ethanol's impact on gasoline prices vary, they are directionally consistent and all of the studies indicate that using ethanol does in fact result in meaningful savings at the pump.

Du & Hayes of the Center for Agriculture and Rural Development (CARD) published a paper in Energy Policy in August 2009 that concluded, "…the growth in ethanol production has caused retail gasoline prices to be $0.29 to $0.40 per gallon lower than would otherwise have been the case." Du & Hayes updated their analysis in April 2011, finding that "…over the sample period from January 2000 to December 2010, the growth in ethanol production reduced wholesale gasoline prices by $0.25 per gallon on average. Based on the data of 2010 only, the marginal impacts on gasoline prices are found to be substantially higher given the much higher ethanol production and crude oil prices. The average effect increases to $0.89/gallon…"

In February 2012, Marzoughi & Kennedy of Louisiana State University presented a paper finding that "…every billion gallons of increase in ethanol production decreases gasoline price as much as $0.06 cents. Adding ethanol to gasoline has the same impact on gasoline as a positive shock to gasoline supply." They further concluded that, "Based on estimation results for the impact of ethanol production on gasoline price, [the amount of ethanol produced in 2011] can lower the gasoline price as much as $0.78 cents per gallon. …This low price means around $107 billion in annual savings for U.S. drivers as a whole." Finally, Du & Hayes updated their analysis again in May 2012, finding that, "…over the period of January 2000 to December 2011, the growth in ethanol production reduced wholesale gasoline prices by $0.29 per gallon on average across all regions. Based on the data of 2011 only, the marginal impacts on gasoline prices are found to be substantially higher given the increasing ethanol production and higher crude oil prices. The average effect across all regions increases to $1.09/gallon…"

There are at least three important dynamics explaining ethanol's ability to reduce gasoline prices.

- **The effect of fuel supply extension on gasoline prices**. Cumulatively, more than 75 billion gallons of ethanol were added to the gasoline supply from 2005-2012 — an average of 9.4 billion gallons annually. Basic economic theory establishes that increasing the supply of substitutable-in-consumption goods will reduce the price for those goods, ceteris paribus. This effect can be understood by considering the analogous example of butter and margarine: prices for butter are forced downward when margarine (a cheaper substitute) is introduced to

[2] Chapman, I., The end of Peak Oil? Why this topic is still relevant despite recent denials. Energy Policy (2013), http://dx.doi.org/10.1016/j.enpol.2013.05.010

[3] 2012 ethanol production totaled 317 million barrels. 214 million barrels of gasoline would be needed to replace the energy found in 317 million barrels of ethanol. 462 million barrels of crude oil are needed to refine 214 million barrels of gasoline.

the marketplace and overall supply of these two substitute goods is enlarged. In the case of ethanol, according to Hayes, "It is as if the US oil refining industry had found a way to extract 10% more gasoline from a barrel of oil." The magnitude of this effect will depend on the amount of the substitute good introduced to the market, the time period over which the good is introduced, the price elasticity of demand, and other factors.

- **The wholesale discount of ethanol to gasoline blendstock**. Ethanol has consistently sold at a discount to gasoline blendstock at the wholesale level since 2007. Since 2010, ethanol prices have averaged approximately 83% the price of RBOB, or $0.47/gallon less (at times, the "spread" has been $1/gallon or wider). This means E10 has been an average of about $0.05/gallon cheaper than unblended gasoline based strictly on straightforward blending economics. The wholesale spread between ethanol and gasoline during this period has served as a strong economic incentive for gasoline blenders and refines to maximize their use of ethanol. Ethanol opponents often suggest ethanol's discount to gasoline is offset by its lower energy content — this argument ignores the larger supply extension effects (discussed in the first bullet point above) and the actual role of ethanol in gasoline blends (discussed in the bullet point below).

- **The price differential between ethanol and other oxygenates and octane sources**. Ethanol is a high-octane fuel that is used ubiquitously by refiners and blenders to increase gasoline octane to the minimum levels required for sale (87 AKI in most states). Using ethanol in lieu of other octane enhancers has allowed refiners to reduce the use of energy-intensive alkylation and reforming units, significantly reducing gasoline production costs. Ethanol has consistently been priced far below other sources of octane over the past several years. In the absence of ethanol, refiners would be required to use much higher-priced octane sources (many of which, incidentally, are highly toxic in nature), which would necessarily increase gasoline prices at wholesale/retail. A recent analysis by the U.S. Department of Energy (DOE) found that even if ethanol prices were 110% the price of CBOB gasoline (compared to 80-85% today), it would still be more economical for refiners to use ethanol for octane enhancement rather than producing octane from other petroleum processes in the refinery.

Ethanol and the RFS are Revitalizing Rural America:

It is important to remember that a central objective in developing a vibrant and robust ethanol industry was to increase demand for agricultural products and enhance farm income. Girded by the RFS, ethanol has become the single most important value-added market for American grain farmers, stimulating investment in agricultural technology and enhancing economic opportunities for rural communities across the country. The emergence of the ethanol industry over the past decade has served as an incredibly important economic catalyst, transforming the grain sector from a stagnating, surplus-driven marketplace to one that is vibrant, high-tech, and demand-driven.

The expansion of the ethanol industry has catalyzed substantial growth in the agriculture sector's output, efficiency, and value. The role of the RFS has been to create a certain and stable market environment for renewable fuels producers and feedstock providers. In turn, this certainty has enabled investment in new agricultural technologies, such as more efficient farm machinery and higher-yielding corn seed. Agricultural gross domestic product (GDP), net farm income, livestock receipts, and crop receipts have all hit new record highs in recent years, indicating that the net impact of ethanol expansion on the agriculture sector has been resoundingly positive.

While the emergence of the ethanol industry has increased demand for corn, U.S. farmers have responded by growing significantly larger corn crops. U.S. corn production has increased tremendously in the "ethanol era." The average annual U.S. corn crop averaged 7.2 billion bushels (bbu.) in the 1980s, 8.6 bbu. in the 1990s, 10.3 bbu. in 2000-2006, and 12.3 bbu. since 2007 (the year EISA was enacted). As a result of larger annual corn harvests and the growing production of animal feed co-products, increased ethanol production has not affected availability of corn for traditional users. Corn supplies available for non-ethanol uses (i.e., the amount of corn and co-products "left over" after net consumption of corn by the ethanol industry) have been larger, on average, since passage of the RFS2 in 2007 than at any other time in history. Corn and corn co-products available for non-ethanol uses averaged 314 million tons (equivalent to 11.2 bbu.) from 2007/08 through 2011/12. This compares to an average of 308 million tons (11.0 bbu.) available for non-ethanol use from 2002/03 through 2006/07 and an average of 300 million tons (10.7 bbu.) from 1997/98 through 2001/02. In other words, the emergence of ethanol as a major source of corn demand has *not* reduced the supply of corn available for other uses, including livestock feed. It is important to note that expanded corn production has come primarily through increased productivity per unit of land (i.e., yield per acre). In 1980, farmers averaged a yield of 91 bushels of corn per acre and produced a crop of 6.6 bbu. In 2009, just a generation later, farmers produced an average yield of 164.7 bushels per acre and harvested 13.1 bbu. *This doubling in size of the American corn crop was achieved by planting just 3% more corn acres in 2009 than were planted in 1980*.

Recent research shows that when farmers receive higher prices for corn, they re-invest more of their income in technologies that further enhance productivity.[4] Every 10% increase in corn prices translates to a 2.5% increase in average corn yields. For example, if corn prices increase from $5.50 to $6.60 per bushel (20%), yields would increase from 150 bushels per acre to 157.5 bushels per acre. This increase in output is driven entirely by the higher market price paid to the farmer.

Meanwhile, contrary to claims that the RFS has "diverted" grain away from livestock and poultry production, U.S. meat output has grown steadily since the original RFS was enacted in 2005. In fact, 2013 production of red meat and poultry is projected to be the second-highest on record (only behind 2008) and 7% higher than output in 2005.[5] Steady growth in production of red meat and poultry show the fallacy of the notion that ethanol expansion and the RFS have somehow eroded U.S. meat output.

Expansion of the ethanol industry over the past decade has created and/or supported tens of thousands of jobs across all sectors of the economy. According to an analysis conducted by Cardno-ENTRIX, the production of 13.3 billion gallons of ethanol in 2012 directly employed 87,292 Americans. An additional 295,969 Americans found work in positions indirectly affiliated with or induced by ethanol production. These 383,260 total jobs helped create $30.2 billion in household income and contributed $43.4 billion to the national Gross Domestic Product (GDP). In addition, more than 200 ethanol plants in 26 states paid $7.9 billion in federal, state and local taxes.

Continued implementation of the RFS, as envisioned by Congress, will further add to the biofuel sector's positive impacts on the U.S. economy. New jobs associated with advanced and cellulosic biofuel production will add to the vibrant work force already created by today's grain ethanol industry. A study by Bio Economic Research Associates found direct job creation from advanced biofuels production could reach 94,000 by 2016 and 190,000 by 2022.[6] Total job creation from advanced biofuels, accounting for economic multiplier effects, could reach 383,000 in 2016 and 807,000 by 2022. Direct economic output from the advanced biofuels industry, including capital investment,

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[4] Goodwin et al. (2012). *Is Yield Endogenous to Price? An Empirical Evaluation of Inter- and Intra-Seasonal Corn Yield Response.* Paper presented at Agricultural and Applied Economics Association 2012 Annual Meeting, August 12-14, 2012, Seattle, Washington. Available at: http://ageconsearch.umn.edu/handle/124884

[5] USDA (April 2013). World Agricultural Supply and Demand Estimates.

[6] Bio Economic Research Associates (2009). *U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030.*

research and development, technology royalties, processing operations, feedstock production and biofuels distribution, is estimated to rise to $17.4 billion in 2016 and $37 billion by 2022.

The RFS has NOT Contributed to Higher Food Prices:

There is no credible evidence whatsoever to support the notion that the RFS is adversely affecting consumer food prices. As explained above, the RFS itself has had little direct impact on agricultural commodity prices; and because the farm value of commodities represents such a small share of retail food prices, the impact of the RFS itself on food prices is indiscernible.

The International Center for Trade and Sustainable Development analysis found that retail prices for chicken *wouldn't have been any different at all* had the RFS not existed in the five years from 2005/06 to 2009/10. Similarly, retail beef and pork prices wouldn't have been any different at all without the RFS, with the exception of one year when prices for each would have been higher by $0.01 per pound. As explained by the author, "[t]he reason for such a small price impact is that feed prices make up a small share of retail prices and because the feed cost impacts from ethanol [policy] over this period are small."[7]

The negligible impact of the RFS on retail food prices is further underscored by recent economic modeling by FAPRI. The FAPRI work estimated that retail beef prices would be $5.30 per pound in 2012/13 *with or without* a full waiver of the RFS. Similarly, a waiver might result in retail pork prices being reduced by just $0.01 from $3.59 to $3.58 per pound, a 0.04 percent change.[8] Moreover, it is notable that annual food inflation rates have, on average, been *lower* since passage of the RFS than they were in the years preceding the program. Annual food inflation has averaged 2.90% since 2005, the year the original RFS was enacted. By comparison, annual food inflation rates averaged 3.02% in the 20 years prior to enactment of the RFS. Further, two of the lowest annual food inflation rates in the last 50 years have occurred since passage of RFS2 in 2007.

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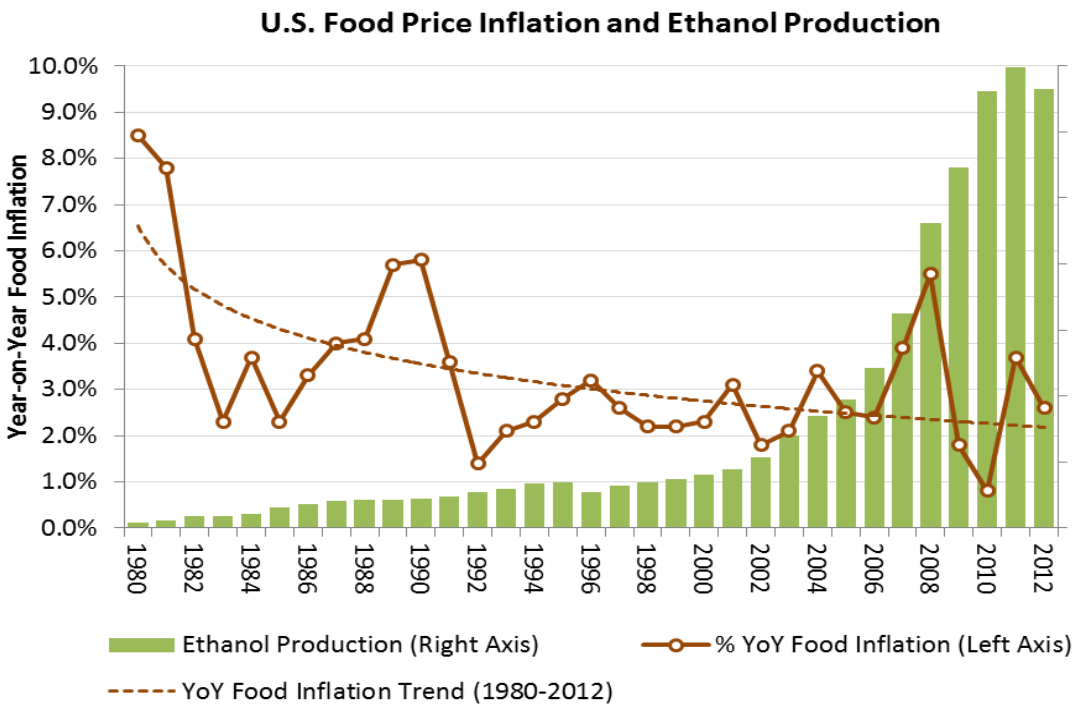
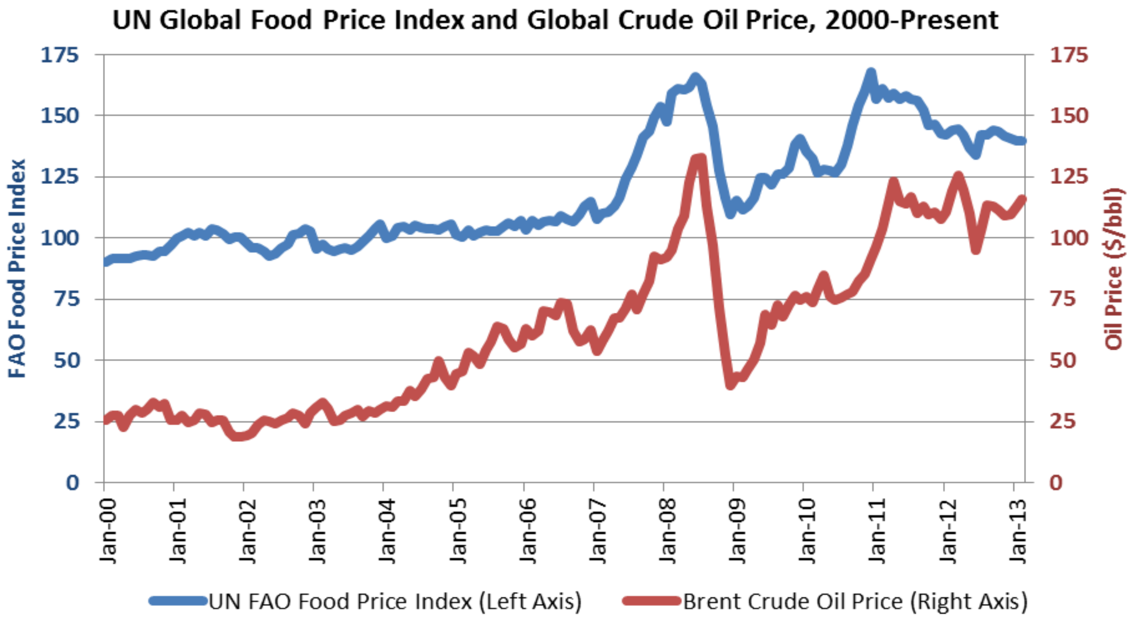
[7] Babcock, B., for ICTSD (June 2011).
[8] Thompson, W., et al. (Oct. 2012).



Source: Bureau of Labor Statistics, Energy Information Administration

What is driving food prices today? Well, petroleum demand and prices also have important effects on U.S. agricultural and food markets. Every step of the food supply chain is reliant on petroleum products — from the use of diesel fuel in farm machinery, to the use of natural gas in food processing plants, to the use of plastics in food packaging, to the use of gasoline and diesel fuel to transport food to the grocery store or restaurant. The correlation coefficient between global food prices and global oil prices since 2000 has been 0.92, which indicates a near-perfect relationship (1.0 is a perfect correlation). We understand that the economic effects of petroleum dependence are outside of the scope of the Committee's current initiative, but biofuels should not be considered in a vacuum.



Ethanol and the RFS are Reducing GHG Emissions

An important policy objective of the RFS2, as adopted by Congress as part of the Energy Independence and Security Act of 2007 (EISA), was to reduce greenhouse gas emissions (GHG) and displace petroleum imports with cleaner, renewable fuels. The RFS is unquestionably reducing GHG emissions today compared to baseline petroleum. As an initial matter, it is important to understand there is a fundamental difference between the carbon cycle of renewable fuels and the carbon cycle of fossil fuels. As highlighted in a recent paper in which scientists from Duke University, Oak Ridge National Laboratory, and the University of Minnesota compared the lifecycle environmental impacts of ethanol and gasoline:

> A critical temporal distinction exists when comparing ethanol and gasoline life-cycles. Oil deposits were established millions of years in the past. *The use of oil transfers into today's atmosphere GHGs that had been sequestered and secured for millennia and would have remained out of Earth's atmosphere if not for human intervention*. While the production and use of bioenergy also releases GHGs, there is an intrinsic difference between the two fuels, for GHG emissions associated with biofuels occur at temporal scales that would occur naturally, with or without human intervention. …Hence, a bioenergy cycle can be managed while maintaining atmospheric conditions similar to those that allowed humans to evolve and thrive on Earth. In contrast, *massive release of fossil fuel carbon alters this balance, and the resulting changes to atmospheric concentrations of GHGs will impact Earth's climate for eons.*[9] (emphasis added)

Indeed, one of the major benefits of using biofuels is that they essentially *recycle* atmospheric carbon. In the case of corn ethanol, for instance, the amount of CO_2 released when the fuel is combusted in an

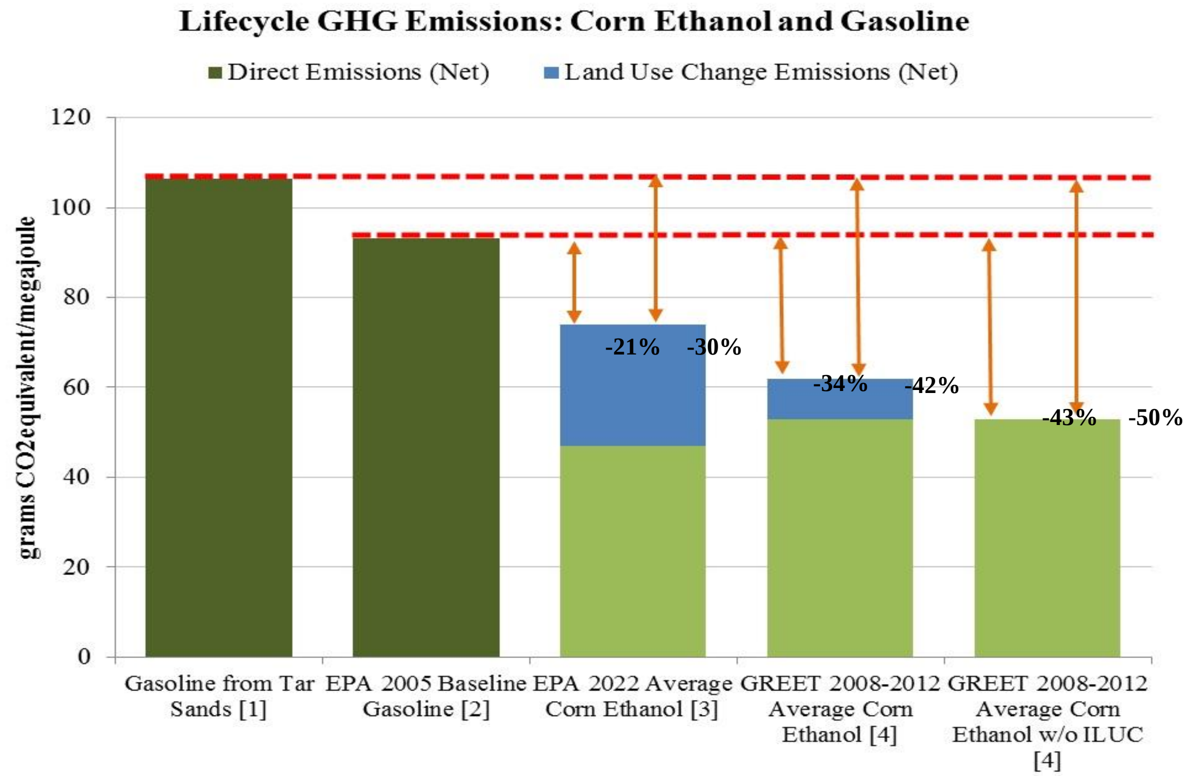
[9] Parish et al. (2012). "Comparing Scales of Environmental Effects from Gasoline and Ethanol Production." *Environmental Management*, 50 (6): 979-1246.

engine has been previously removed from the atmosphere via photosynthesis during growth of corn plant. Although there may be temporary shifts between atmospheric and terrestrial stocks of carbon within the active carbon cycle, the carbon released into the atmosphere during this process is not "new" carbon being introduced into the earth's carbon cycle. Biogenic carbon emissions then are considered "carbon neutral" based on the feedstock's carbon uptake. For annual crops like corn, this carbon cycle occurs every year with each new harvest.

While CO_2 emissions from fuel ethanol combustion are carbon neutral, there are some GHG emissions associated with the production and distribution of the fuel. These supply chain emissions are the subject of "lifecycle analysis." A recent lifecycle analysis paper by Wang et al. published in the journal *Environmental Research Letters* found that corn ethanol produced in the 2008-2012 timeframe reduced GHG emissions by an average of 34% compared to baseline gasoline.[10] Importantly, that figure *includes hypothetical emissions from indirect land use change* (ILUC) for corn ethanol and uses a carbon intensity value for baseline gasoline that is nearly identical to the value used by the U.S. Environmental Protection Agency (EPA) for the RFS2. If ILUC emissions are excluded from the calculation (i.e., if an equitable comparison of only direct emissions is made), today's average corn ethanol reduces GHG emissions by 44% relative to gasoline, according to Wang et al.

The results from Wang et al. are consistent with several other independent lifecycle analyses of corn ethanol. For example, Liska et al. (2009) found modern corn ethanol reduces direct GHG emissions by 48-59% compared to gasoline.[11] Meanwhile, a report by O'Connor for the International Energy Agency found 2005-era corn ethanol reduced direct GHG emissions by 39% compared to gasoline, with reductions of up to 55% expected in the near future.[12] Further, the California Air Resources Board (CARB) has certified individual pathways for nearly 30 grain ethanol plants that serve the California market for the state's Low Carbon Fuels Standard (LCFS). The ethanol produced by these plants reduces direct GHGs by an average of 40-45% relative to baseline gasoline, according to CARB.[13] Incidentally, CARB recently reported that ethanol has provided 80% of the GHG emissions reductions required under the LCFS to date.[14]

[10] Wang et al. (2012). "Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use." *Environ. Res. Lett*., 7 (2012) 045905 (13pp).
[11] Liska, A.J., H.S. Yang, V.R. Bremer, T.J. Klopfenstein, D.T. Walters, G.E. Erickson, and K.G. Cassman (2009). "Improvements in Life Cycle Energy Efficiency and Greenhouse Gas Emissions of Corn-Ethanol." *Journal of Industrial Ecology*. 13(1): 58-74.
[12] O'Connor, D., for International Energy Agency (2009). "An examination of the potential for improving carbon/energy balance of bioethanol." IEA Task 39 Report T39-TR1, 72 pp.
[13] See CARB (2013). "Method 2A-2B Carbon Intensity Applications. " http://www.arb.ca.gov/fuels/lcfs/2a2b/2a-2b-apps.htm
[14] See CARB (2013). "LCFS 2012 Q4 Data Summary." http://www.arb.ca.gov/fuels/lcfs/20130329_q4datasummary.pdf

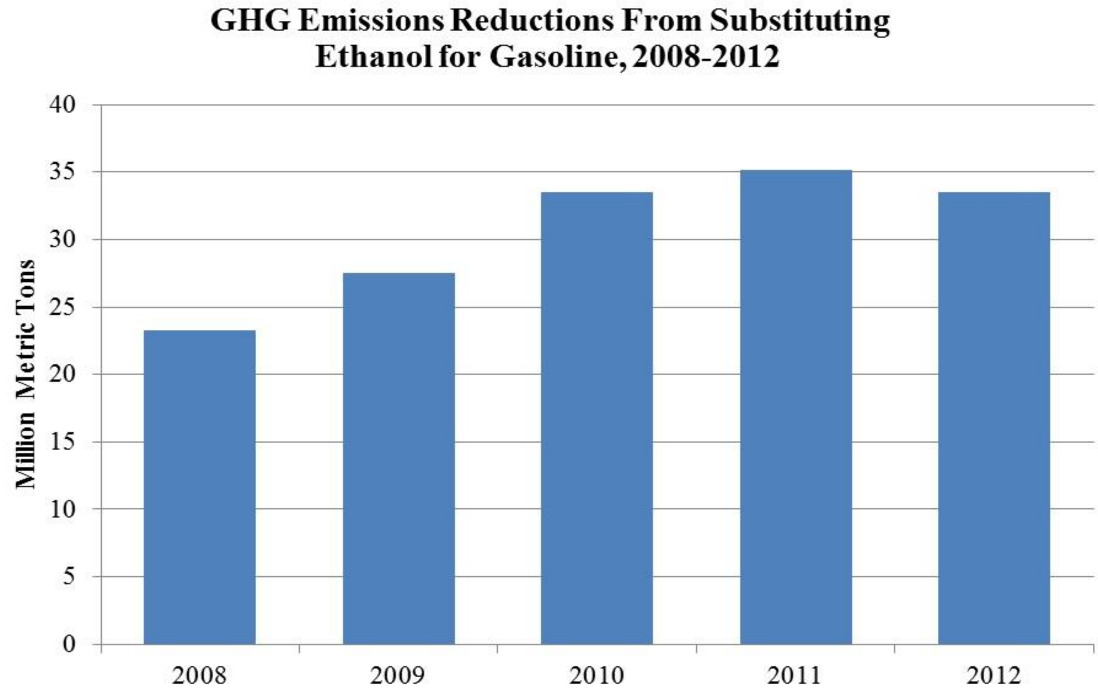


[1] NETL (2009), An Evaluation of the Extraction, Transport and Refining of Imported Crude Oils and the Impact of Life Cycle Greenhouse Gas Emissions, March 27, 2009, U.S. Department of Energy, DOE/NETL-2009/1362.
[2-3] EPA (2010). RFS2 Final Rule.
[4] Wang et al. (2012). "Well-to-wheels energy use and greenhouse gas emissions of ethanol from corn, sugarcane and cellulosic biomass for US use." *Environ. Res. Lett*., 7 (2012) 045905 (13pp).

The latest results presented by Wang et al. were obtained from an updated and re-structured version of the DOE's "GREET" model.[15] Recent versions of the GREET model have incorporated updated data and assumptions from the 2008-2010 timeframe regarding emissions related to ethanol plant energy use, grain production, and land conversion. Unfortunately, these updates to the GREET model were conducted shortly after EPA finalized its RFS2 lifecycle analysis, meaning the versions of the GREET model used by the Agency were already obsolete by the time the RFS2 final rule was promulgated.

Based on the lifecycle emissions reported for ethanol and gasoline in the Wang et al. paper, substitution of corn ethanol for gasoline in the 2008-2012 time period has conservatively reduced GHG emissions from the transportation sector by 153 million metric tons of CO_2-equivalent (CO_2e), or an average of 30.6 million metric tons per year (Figure 2). The GHG emissions reduction associated with substituting ethanol for gasoline has been equivalent to removing an average of 6.4 million vehicles from America's roadways annually from 2008 to 2012.[16]

[15] **G**reenhouse Gases, **R**egulated **E**missions, and **E**nergy Use in **T**ransportation Model. See http://greet.es.anl.gov/
[16] Assumes annual average CO_2e. emissions of 4.8 metric tons per light duty vehicle (EPA). See www.epa.gov/cleanenergy/energy-resources/refs.html



Source: Argonne GREET 1 2012 rev2. Corn ethanol emissions = 62 g/MJ (incl. 9 g/MJ ILUC); gasoline emissions = 93 g/MJ. Note ILUC emissions are average values (i.e., variable timing of emissions not considered)

A recent study of 2012-era ethanol and corn production practices by the University of Illinois-Chicago reveals additional improvements that would further reduce corn ethanol's lifecycle GHG emissions beyond the levels reported in Wang et al. and shown in Figure 1. The study shows thermal energy use at a typical dry mill ethanol plant has fallen another 9% since 2008, as the amount of ethanol produced per bushel of grain increased 1.4%. Additionally, the study showed increasing adoption of new practices and technologies in the feedstock production phase. Importantly, current energy use by the average ethanol plant is *already* below the levels assumed by EPA for an average plant in 2022.

While the renewable fuels used for RFS compliance today are clearly reducing GHG emissions relative to 2005 baseline petroleum, the comparison to a 2005 petroleum baseline understates the *actual* GHG savings associated with using renewable fuels. As corn ethanol's lifecycle GHG emissions have trended downward over the past decade, the lifecycle GHG emissions associated with petroleum have increased. A 2009 study by DOE's National Energy Technology Laboratory showed that gasoline from tar sands has lifecycle GHG emissions of 106.4 g CO_2e/megajoule (MJ).[17] This is 14% higher than the lifecycle GHG emissions assumption of 93.1 g/MJ for EPA's 2005 baseline gasoline. Because unconventional crude oil sources like tar sands and tight oil from fracking make up a much larger share of the U.S. crude oil slate today than in 2005, ethanol's true GHG benefits are significantly understated by EPA's analysis. When ethanol is compared directly to the unconventional petroleum sources it is displacing a the margin of today's fuel market, the actual GHG savings are much greater than when ethanol is compared to a static gasoline baseline from eight years ago.

[17] NETL (2009), An Evaluation of the Extraction, Transport and Refining of Imported Crude Oils and the Impact of Life Cycle Greenhouse Gas Emissions, March 27, 2009, U.S. Department of Energy, DOE/NETL-2009/1362.

Concern About the "Blend Wall" is no Reason to Dismantle the RFS

In creating a market for 36 billion gallons of renewable fuels, Members of Congress most certainly knew in 2007 that such a large volume of fuel could not be absorbed by the gasoline market expected in 2022 without changes to the vehicle fleet and fuel distribution infrastructure. While nobody anticipated that gasoline demand would fall as it has, largely in response to the skyrocketing oil and gasoline prices in 2008 that precipitated a world-wide recession, there was absolutely an expectation that renewable fuels would have to move beyond just being a blend component in gasoline. Indeed, that was the intent.

By early 2009, it was clear that the arrival of the so-called E10 blend wall may occur sooner than was expected in 2007. In fact, in the analysis that accompanied EPA's proposed rule for the RFS2, the Agency wrote, "…under the proposed RFS2 program, we are projected to hit the E10 'blend wall' of about 14-15 billion gallons by 2013."[18] EPA's final rule for the RFS2 underscored this point again, stating, "…the nation is expected to hit the blend wall in 2013 under our high-ethanol control case [and] in 2014 under our primary mid-ethanol control case…. Regardless, to meet today's RFS2 requirements using increased volumes of ethanol we are going to need to see growth in flexible fuel vehicles (FFVs) and E85 infrastructure and increases in FFV E85 refueling rates."[19] To suggest that the blend wall was not anticipated to occur in the 2013/14 timeframe is simply not truthful.

The RFS was intended to drive innovation in technology by fostering investment in cellulosic ethanol and other advanced biofuels. It has done that. While slower than hoped, commercialization of these new technologies is occurring today. The RFS was also intended to drive innovation in the marketplace, with E85 and other blends providing consumers choice at the pump. In fact, the auto companies responded to that policy objective by expanding their production of FFVs that can use up to 85% ethanol. Fifty-percent of the automobiles produced by domestic auto manufacturers are FFVs today, and there are now greater than 15 million FFVs on the road. If those vehicles had consistent access to E85 infrastructure, they could consume some 6-7 billion gallons of ethanol on an annual basis. The problem, of course, is that refiners and their downstream partners have fought the introduction of E85 at every turn, refusing to invest in E85 infrastructure, discouraging their franchisees from making such investments or offering non-branded products to consumers.

The bottom line is that Congress knew EISA would require the marketplace to adapt to the increasing demand for renewable fuels, far beyond ethanol's use as a blend component. The renewable fuels industry responded by increasing production and making investments in new technologies. The auto industry responded by dramatically increasing their production of FFVs. But the oil industry has thus far steadfastly refused to provide the market access necessary to meet the EISA volumes, coming to Congress now for relief from a problem they have created!

As long as the RFS stays in place and is allowed to work as intended, it will create the economic incentive for gasoline marketers to install the infrastructure necessary to blend E85, E15 or other higher blends. Today's market for Renewable Identification Numbers (RINs) will provide that incentive. In response to higher RIN prices, we have already seen increased E85 use, and renewed interest in E15. That is the genius of the RFS, the credit system not only provides flexibility, but it also provides the incentive to drive innovation in the marketplace.

The market-driving benefit of the RFS credit program was recently affirmed by BP Biofuels CEO Phil New, who stated:

[18] EPA. May 2009. "Draft Regulatory Impact Analysis: Changes to Renewable Fuel Standard Program." EPA-420-D-09-001
[19] EPA. February 2010. "Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis." EPA-420-R-10-006

"[t]he conventional RIN markets are responding to the blend wall – exactly as could have been anticipated. The RIN markets are now starting to incentivize all members of the value chain to seek ways to resolve the blend wall. What had become a static, entrenched relationship is now starting to look much more fluid, as the incentives provided by the RIN markets provide a real prompt to innovation – not just on the supply side, but for the better demand side players as well."[20]

Similar comments have come from oil industry economist Phil Verleger, who said:

- "In short, no RIN problem exists. Instead, the trouble has been created by the stubborn resistance of some refining companies…to the RFS program."
- "…refiners have resorted to "export blackmail" rather than try other solutions. One of these would be sales of E85 (85:15 ethanol/gasoline), which would alleviate the problem."
- "…the obvious solution to the RIN price problem involves no EPA intervention and no regulatory action at this point. It simply calls for boosting E85 sales.
- "Refiners and marketers could meet their RFS requirements by boosting E85 sales."[21]

The message is clear. Let the RFS work and solutions to the blend wall will be found!

Viable options exist for breaking through the E10 "Blend Wall" and meeting RFS requirements with physical ethanol volumes instead of paper RIN credits. E15 and E85 blends are legally approved and offer a workable pathway for meeting increased RFS volumetric requirements. Only slight increases in E15 consumption would be needed in 2013 to satisfy this year's RFS obligations with physical gallons rather than banked RINs. If E15 accounted for **just 1%** of total gasoline sales in 2013, the RFS requirement for renewable fuel could be met strictly with physical gallons of ethanol.[22]

The Regulatory Impact Analysis that accompanied the RFS2 final rule includes a detailed assessment of the costs to modernize fuel distribution infrastructure to accommodate higher-level ethanol blends under the RFS. Notably, the analysis is based on input from petroleum terminal operators, the rail industry, the marine transport sector, the trucking industry, retail gas station owners, manufacturers of fuel storage and dispensing equipment, and other industry sources.

One scenario in the analysis examined the cost of upgrading the fuel distribution system from handling a baseline of 13.2 billion gallons of ethanol annually to accommodating 33.2 billion gallons of ethanol — a 20-billion-gallon increase. The results of this scenario indicated a total capital investment of $9.9 billion would be necessary to modernize the terminal, fuel transportation and retail infrastructure. According to the analysis, ***that works out to just <u>6 cents of capital investment per gallon</u> of additional ethanol use over the baseline.*** When amortized over total gasoline sales, the infrastructure costs would be ***fractions of a cent per gallon***. These costs include construction of new rail cars, new tank barges, new tank trucks, new and retrofitted storage tanks and blending equipment at petroleum terminals, unit train receiving infrastructure, manifest rail receipt facilities, and marine terminal infrastructure. Additionally, the estimate includes the costs to outfit retail stations for higher-level

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[20] 8th Annual World Biofuels Markets, Beurs World Trade Center, Rotterdam, Netherlands, March 13, 2013, Biofuels Digest.
[21] Philip K. Verleger, Jr., President, PKVerleger LLC. "The Price of RINs: How High! How Stupid!" March 2013.
[22] Assumes gasoline demand of 133.8 billion gallons, 13.38 billion gallons of ethanol use at E10, and 200 million gallons of ethanol use at E85. Thus, 220 million gallons of ethanol would need to be consumed as E15 to meet the 13.8 billion gallon RFS requirement for "renewable fuel." This means 1.47 billion gallons of E15 would need to be consumed, which equates to 1.09% of projected gasoline demand. Does not account for impact of sugarcane ethanol imports that may be used to meet advanced biofuel standard.

blends, including installation of new dispensers, hanging hardware, refueling island hardware, automatic tank gauging equipment, canopy installation, underground storage tanks, and other retail infrastructure.

All of this means the higher-ethanol blend infrastructure necessary to bridge the gap between the infamous E10 "blend wall" (approximately 13.3 billion gallons) and the 2013 RFS requirement of 13.8 billion gallons would cost about $30 million—or $0.00023 per gallon of expected 2013 gasoline sales.

The Flexibility of the RFS Obviates the Need for Legislation

The Clean Air Act's RFS includes numerous provisions providing flexibility to both obligated parties and the EPA that would mitigate any potential negative impacts on consumers. These provisions include:

- RIN Banking and Trading
- RIN Roll-Over Allowances
- Deficit Carry Forward Provisions
- Small Refiner Exemptions
- RIN Interchangeability
- Annual Renewable Volume Obligation (RVO) Adjustment
- Cellulosic Biofuel Waiver Provisions
- Advanced Biofuel Standard Adjustment
- Total RFS Adjustment
- Future Modification of Applicable RFS Volumes

In short, these measures are intended to 1) afford EPA the ability to administratively adjust RFS requirements on an annual basis in light of prevailing fuel market and economic conditions, and 2) provide obligated parties the ability to comply with annual RFS requirements in the event of a shortage of renewable fuel or other market anomaly. Experience to date has clearly demonstrated that both EPA and obligated parties exercise these provisions when necessary. The EPA, for example, has dramatically reduced the cellulosic requirement each year to date in recognition of the slow pace of commercialization. And obligated parties have made effective use of RIN banking and trading, and RIN roll-over allowances since the program's inception. We believe strongly these flexible provisions are all that are needed to effectively implement the RFS.

Conclusion

The RFA looks forward to working with you to further develop and implement sound policies that provide the proper incentives to grow the U.S. ethanol industry.

Thank you.