



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

**Written Testimony of Dr. Jeremy Martin
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**Before the Subcommittee on Energy Policy, Health Care and Entitlements,
Committee on Oversight and Government Reform United States House of Representatives**

June 5, 2013

Thank you for the opportunity to testify about the important challenges facing biofuels policy today. My name is Jeremy Martin. I am a senior scientist working on biofuels policy at the Union of Concerned Scientists. UCS is the nation's leading science-based nonprofit putting rigorous, independent science to work to solve our planet's most pressing problems.

My written testimony addresses the goals of the Renewable Fuels Standard (RFS) and describes the flexibility built into the RFS. My testimony also recommends an implementation strategy to address the significant challenges facing biofuels policy today, while maintaining support for investments in advanced biofuels that will move us beyond food based fuels and realize the goals of the RFS, albeit on a slower schedule than the current timeline of the RFS. We need to move forward these next generation better biofuels and to get there we need a stable RFS to serve as a foundation for investments. For that reason, we do not support legislative changes to the RFS.

The goals of the RFS are smart goals

It is important to start by acknowledging the important role that the RFS plays in achieving a cleaner fuel future, based on three important and well-crafted goals:

- **More Biofuels:** Expanded production of clean biofuels, together with improved efficiency, electric vehicles and other innovative technologies can cut our projected oil use in half over the next twenty years, and by reducing our oil use we reduce the problems our oil use causes our economy, our security and our climate.
- **Better Biofuels:** The RFS is not static, it requires the biofuels industry to get cleaner over time, so that the biofuels called for in the RFS over the coming years are different, and cleaner, than those of today. Moreover, the RFS is based on full lifecycle impact of biofuel production, including the impacts that large-scale biofuel use has on agriculture and land use change in the United States and around the world.
- **Beyond Food:** The RFS recognizes the limited potential to use food as fuel. For this reason the big target – the 36 billion gallon headline number – relies on cellulosic biofuel, made from non-food biomass, more than it relies on corn based ethanol.

The challenges caused by today's biofuels

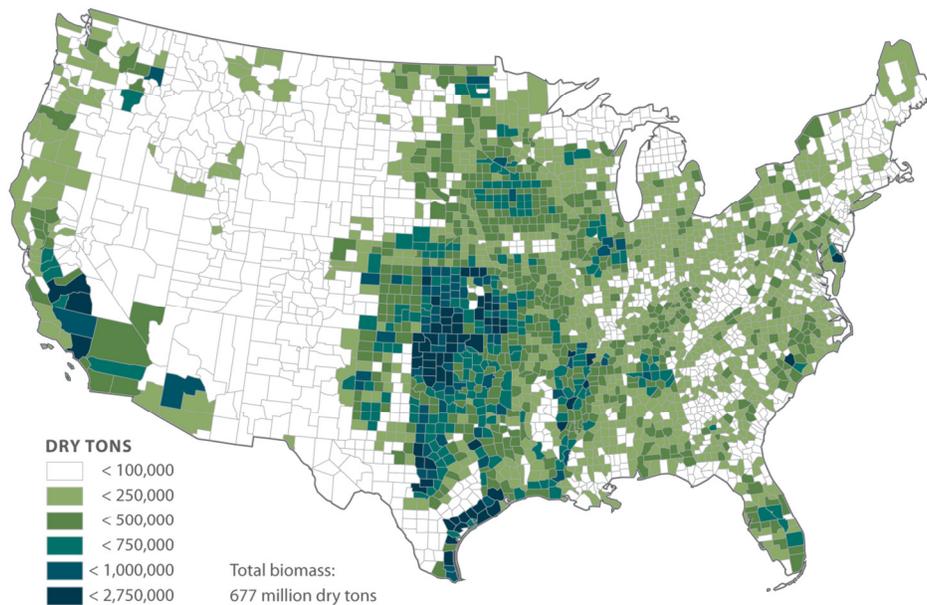
That said, it is also important to acknowledge that neither the RFS, nor its implementation to date, have been perfect. The rapid expansion of corn ethanol over the last decade, under a variety of policies culminating in RFS2, along with the expansion of vegetable oil-based biodiesel, primarily in the European Union, has profoundly altered global agricultural markets. These changes are contributing to higher food prices in the U.S.

and the developing world, accelerating deforestation, and exacerbating other problems like water pollution caused by corn farming.

Policy – including, and not just the RFS, but tax policy, trade policy, agricultural policy, and policy on fuel additives - certainly played a major role in creating these problems. However, reversing course on the RFS will not solve these problems. By most independent analyses, ethanol blends approaching 10% are here to stay, with or without the RFS. So failing to deliver on the full vision of the RFS means we stay where we are, with corn ethanol and gasoline, but with no prospect of moving to cleaner biofuels going forward. Rather than locking in the status quo, the smart choice is to keep moving forward on the longer-term goals of the RFS, the goals of better biofuels that go beyond food.

The role of biomass based fuels

In contrast to the challenges of food based fuels, the opportunities to expand non-food cellulosic biofuels are substantial. According to our recent analysis¹, the domestic resources to produce biomass are far in excess of what is required to meet the 16 billion gallon target for the RFS in 2022.



Using wastes, agricultural residues like corn stalks, and environmentally friendly perennial grasses to make fuel can expand the opportunities to produce biofuels beyond the corn belt to many more states, and can do so while playing a positive role in our agricultural system, helping to reduce pollution caused by intensive corn farming. The biomass resources are available, but to realize their potential, we also need a large scale industry to make them into useful fuel.

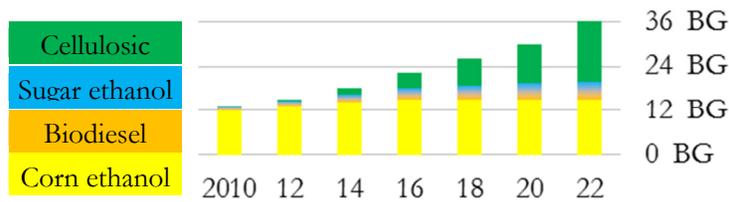
The first commercial scale cellulosic biofuel facilities are starting up now in Florida and Mississippi, and several more are under construction in Iowa and Kansas. This is a major milestone, and it would not have happened without the RFS. But while the progress is encouraging, it is delayed compared to the schedule described in the

¹ Union of Concerned Scientists (UCS). 2012. The promise of biomass: clean power and fuel – if handled right. Online at http://www.ucsusa.org/assets/documents/clean_vehicles/Biomass-Resource-Assessment.pdf.

RFS. It will take time to scale up a new fuel industry, as it did for both the oil and corn ethanol industries. And the economic headwinds of the last few years didn't help. But regardless of the reason, the gap between the schedule laid out in 2007 and the actual scale-up means EPA needs to adapt their administration of the RFS going forward to the circumstances today.

The RFS is a flexible policy framework

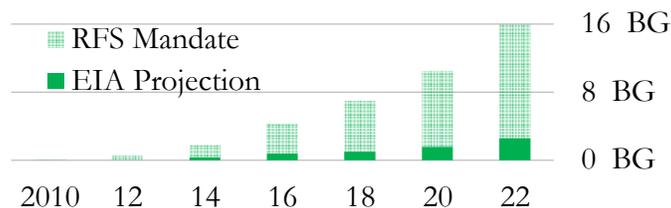
The RFS is a more flexible policy than many people appreciate, and Congress was smart to give EPA the authority to adapt the second phase of the policy to circumstances, and move us forward in a pragmatic way. Now EPA must use that flexibility and provide more clarity on the path ahead. To start with, EPA should acknowledge that 36 billion gallons (BG) is no longer a realistic target for 2022.



In fact, a careful reading of the RFS reveals that it not really a 36 billion mandate for 2022 at all. It is more accurately described as a mandate for 20 billion gallons, plus whatever level of cellulosic biofuel production is actually achieved, up to a maximum of 16 billion gallons (call it a 20BG + RFS for short). Of this, 15 billion gallons comes from conventional biofuels like corn ethanol, which is already built out and for the most part locked into fuel markets. There is also a mandate for non-cellulosic advanced biofuels, fuels like biodiesel, sugarcane ethanol, and some newcomers like ethanol from grain sorghum and biobutanol. This mandate grows steadily to 5 billion gallons in 2022, which may sound modest compared to 15 billion gallons of corn ethanol, but is actually a very rapid expansion from where these fuels are now. So that adds up to 20 billion gallons. But the largest part of future mandate growth was supposed to come from cellulosic biofuels.

However, the scale-up of cellulosic biofuels is not happening at the rate anticipated in the original RFS schedule. Even with robust investment and steady growth, cellulosic biofuel production capacity in 2022 will probably be closer to 2 billion gallons than 16 BG (projection data in the figure below is from the 2012 Annual Energy Outlook²).

Mandates vs. projections

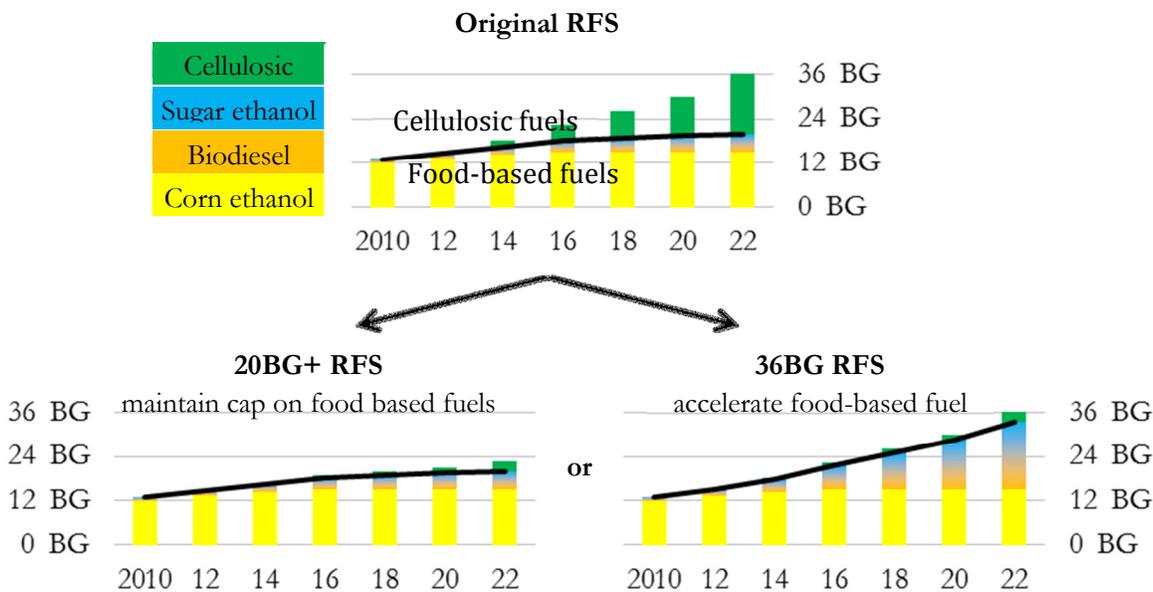


² Energy Information Administration. 2012. Annual Energy Outlook 2012. Online at [http://www.eia.gov/forecasts/aeo/pdf/0383\(2012\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf).

The RFS anticipated this possibility, and requires the EPA to adjust the mandates annually in line with projected capacity, a requirement reaffirmed in the recent court ruling³. So in total the real minimum mandate for 2022 is likely to be closer to 22 billion gallons than 36 BG, and it will be 2030 before we are likely to see a full 36 billion gallon mandate reached.

EPA has an important decision to make

EPA has the authority to backfill this cellulosic shortfall in part or in full, by expanding the mandates for biodiesel, sugarcane ethanol and other non-cellulosic advanced biofuels. This is described schematically in the figure below. On the left is the path forward if EPA adjusts the advanced and conventional mandates by the same amount as the cellulosic mandate. This maintains the same growth rate for non-cellulosic advanced biofuels, and the same impact on food markets, as in the original RFS schedule. But, with reduced production of cellulosic biofuel, the 20BG+ RFS will not reach 36 billion gallons in 2022. To reach the full 36 billion gallon target will likely take at least until 2030. On the right is the trajectory if EPA does not adjust the advanced mandate with the cellulosic mandate, and tries to stay on track for 36 billion in 2022 (the 36BG RFS). To accomplish this requires the food based advanced biofuels like sugar ethanol and vegetable oil based biodiesel to grow to more than 18 billion gallons, instead of the 5 billion gallons in the original schedule.



Doing this might seem to keep us closer to the original schedule, but it comes at the expense of dramatically expanding the use of food based fuels. Our analysis, and that of agricultural economists from Illinois to the Organization for Economic Co-operation and Development, demonstrates that the actual consequences of trying to make up for the missing cellulosic biofuels with biodiesel or sugarcane ethanol will lead to unintended counterproductive outcomes⁴. These include a massive circular ethanol trade with Brazil, exchanging billions of

³ American Petroleum Institute v. U.S. Environmental Protection Agency, 12-1139, U.S. Court of Appeals for the District of Columbia Circuit (Washington).

⁴ For more details, see our comments on U.S. Environmental Protection Agency’s “Regulation of Fuels and Fuel Additives: 2013 Renewable Fuel Standards” 78 Fed. Reg. 9282 (February 21, 2013) [EPA-HQ-OAR-2012-0546]

gallons of our corn ethanol for Brazilian sugar ethanol, and mandates for biodiesel that exceed available resources in the U.S., and, indirectly, cause increases in production of palm oil in Southeast Asia that would accelerate deforestation with emissions that undermine the goals of the RFS. Trying to stay on the original schedule without the needed cellulosic biofuel production capacity also creates major problems for our vehicle and fueling infrastructure.

Smarter implementation helps to address the blend wall in a responsible manner

There are also real challenges adapting our vehicle and fueling infrastructure to a changing set of fuels. But what is commonly called the “blend wall” is, in reality, more like a set of speed bumps. There is no reason we need to fuel up with at least 90% gasoline forever. But if we try to change our fuel mix faster than our vehicles and fueling infrastructure can accommodate, we may undermine the transition we need to make. Under the RFS implementation strategy we advocate, the scale up of advanced biofuels will be more gradual than is presently anticipated. This provides time and flexibility for the market to adjust. Biofuel use can move past the blend wall through increased use of higher blends, as well as drop in fuels including butanol and renewable gasoline and diesel. Renewable Identification Number (RIN) prices make this economically viable, but the transition beyond E10 must be managed to ensure volumes grow in sync with the required vehicle and fueling infrastructure.

2012 corn ethanol waiver request

UCS submitted comments urging EPA to adjust the mandate for 2013 in light of the drought, and we disagreed with their decision not to grant any waiver⁵. The economic analysis EPA relied on for their decision found that at blending levels up to E10, changes in the mandate would not substantially change the actual amount of ethanol production, and therefore would not have resulted in significant relief for other users of corn. By in large we agree with this analysis, and several independent analysts came to similar conclusions. However, while the opportunity to provide relief was limited, the analysis suggested it was not insignificant. In light of this we encouraged EPA to make a modest 15% adjustment to the 2013 mandate. We argued that such an adjustment would have reduced the risk that the mandate hinders the market-based rationing of the diminished corn crop in 2013. However, we argued against a larger waiver, since larger adjustments wouldn't have provided additional relief, and would destabilize the RFS.

The analysis that EPA used to reach their decision to reject the 2012 waiver requests was particular to the circumstance in the ethanol market that year. Two key factors, the incentive of blenders to blend up to E10, even in the absence of a binding mandate, and the presence of a large stock of carry-forward RINs from over compliance in previous years provided compelling reason to doubt that a waiver would provide relief. Perhaps the most compelling evidence came in the form of the very low RIN prices for conventional ethanol that prevailed at that time, suggesting that even at those low prices obligated parties were not interested in avoiding their compliance obligation.

The circumstances upon which EPA based its analysis in the 2012 waiver decision are unlikely to be repeated. The low RIN prices which prevailed at the time of the decision have given way to higher prices, which suggest that obligated parties would reduce ethanol use in the event of a waiver. This is to say that market conditions beyond E10 are different in important ways than they are with mandates below E10. The current RIN prices

⁵ See our comments to US Environmental Protection Agency's "Request for Comment on Letters Seeking a Waiver of the Renewable Fuel Standard" 77 Fed. Reg. 52715 (August 30, 2012) [EPA-HQOAR-2012-0632; FRL-9721-7]

suggest that the RFS is starting to work as designed, to support the use of biofuel in excess of what would have occurred without the policy. This is a feature of the RFS design, rather than a bug. An implication of this feature is that under these circumstances EPA waivers will be expected to significantly alter fuel markets, which will give them the opportunity to provide relief in future crisis that their analysis suggested they lacked last year.

Because of the importance of biofuel policy to agricultural markets, it is important for EPA to be flexible in their implementation of the RFS, and to take into consideration of the impact of fuels policy to these markets. While last year's drought was a significant event, the decisions EPA has to make about the future course of the RFS are even more important. It is illustrative of the profound impact of EPA decisions on U.S. and the world agricultural markets that the Organization for Economic Co-operation and Development and the Food and Agriculture Organization of the United Nations devoted an entire chapter of their global long-term agricultural outlook to biofuels, and about half of that to evaluating the future of the RFS⁶.

A Smart Path Forward

EPA should get out ahead of this challenge, and start using the flexibility Congress gave them in the administration of the RFS. The magnitude of the cellulosic shortfall was small in the last few years, but it grows rapidly from 2013 forward. In light of tight markets for agricultural commodities – not just corn but sugar and vegetable oil as well – and the infrastructure issues like the blend wall, there are major challenges coming by 2015 that will require EPA to show more flexibility than they have to date.

We are urging EPA to seize the opportunity, and do a significant rulemaking, looking not just at annual volume levels, but at resetting expectations for the next phase of the policy, from 2016 to 2022. Working with stakeholders, and in concert with DOE and USDA, EPA should develop a roadmap that delivers on the important goals of the RFS, but is realistic about where we are today, and about constraints in agriculture, the rate at which cellulosic production capacity can realistically scale up, and in our vehicle and fueling infrastructure.

We are not moving forward as fast as we hoped to be in 2007, but the RFS is still pointing us in the right direction. To keep moving forward we need to provide the regulatory stability that will protect the early investments in the advanced biofuels industry, and support further investment to bring the technology to larger scale.

Thank you, again, for the opportunity to be here today. I look forward to answering any questions you may have.

⁶ Organization for Economic Co-operation and Development (OECD) and Food and Agriculture Organization of the United Nations (FAO) Agricultural Outlook 2012-2021. 2012a. Increased productivity and a more sustainable food system will improve global food security. Online at <http://www.oecd.org/site/oecd-faoagriculturaloutlook/>.

Committee on Oversight and Government Reform
Witness Disclosure Requirement – "Truth in Testimony"
Required by House Rule XI, Clause 2(g)(5)

Name: Jeremy Isaac Martin

1. Please list any federal grants or contracts (including subgrants or subcontracts) you have received since October 1, 2010. Include the source and amount of each grant or contract.

None

2. Please list any entity you are testifying on behalf of and briefly describe your relationship with these entities.

My employer, the Union of Concerned Scientists.

3. Please list any federal grants or contracts (including subgrants or subcontracts) received since October 1, 2010, by the entity(ies) you listed above. Include the source and amount of each grant or contract.

None

I certify that the above information is true and correct.

Signature:



Date: June 3, 2013



Dr. Jeremy Martin is a Senior Scientist in the Union of Concerned Scientists' Clean Vehicles Program. His recent report for UCS, "The Promise of Biomass: Clean Power and Fuel – If Handled Right," quantifies the opportunity to produce clean biofuels made from waste products and environmentally friendly perennial grasses. Realizing this potential is a key element of the broader UCS plan to cut projected oil use in half over the next twenty years. He has also studied the role of biofuels in "The Energy Water Collision," a UCS investigation of the connections

between energy and water use. Most recently Jeremy has focused on improving biofuels tax policy to support innovation and cleaner fuels while building on the policy framework of the Renewable Fuels Standard.

Dr. Martin has also played an active technical role in the EPA's Renewable Fuel Standard Regulations and served as a member of the California Air Resources Board's Low Carbon Fuel Standard Expert Workgroup. Dr. Martin is the author of more than 15 technical publications and 13 patents on topics ranging from biofuels lifecycle accounting to semiconductor manufacturing and polymer physics.

Before joining UCS, Dr. Martin worked in research, development and manufacturing of computer chips at Advanced Micro Devices. Dr. Martin received his Ph.D. in chemistry and chemical engineering from the California Institute of Technology and a bachelor's degree in chemistry and English literature from Haverford College.