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Renewable Fuel Standard: Driving Change or Maintaining Status Quo?

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It is said that you should never discuss religion and politics in polite company, but sometimes I feel like this saying should be never discuss religion, politics and bio-fuels in polite company. In the best situations, when I say that I work on biofuels policy, I get an interested nod and a polite question about fuels made from algae. In the other extreme I get a look that borders on a scowl and then a comment about how biofuels are a waste of government money and that the fuels made from bio sources (whatever those might be) are sub-standard. That's quite a range of reactions, and one that has motivated me to dig into the details of this controversy.

To start a rational discussion it is first necessary to say that there are many different types of biofuel. Bio-fuel is just a general name for any type of fuel that happens to be made from biomass. Let's start by splitting the term biofuel in half and discuss the bio side and the fuel side separately. The term fuel certainly has its legal definitions, but generally it is any chemical molecule that can be burned in an internal combustion engine. In the United States that means any chemical that can approximate gasoline or diesel. The vast majority of biofuel in the US is ethanol, an alcohol that can be mixed with gasoline, and the most common diesel replacements are fatty acid methyl esters (biodiesels). The bio side of the fuel equation is much more complicated as these two fuels (alcohols and biodiesels) can be made from a variety of biomass sources and newer scientific processes are opening the doors to even more options. However, to even define the term biomass (sometimes referred to as renewable biomass) is to invite controversy related to overall sustainability of the finished fuel due to land use change and carbon versus non-carbon emissions. The US government doesn't even have a single definition of renewable biomass. Different parts of the government use different definitions all with slightly different specifications. These subtleties can mean the difference between receiving a tax credit, being eligible for a grant, or being able to participate in the Renewable Fuel Standard (RFS) ... or not.

Policies such as the Renewable Fuel Standard (RFS) are attempting to regulate the embedded emissions within a biofuel by establishing a complex mandate to use four different types of biofuels (cellulosic, advanced, biomass-based diesel, and renewable) each with their own, different, greenhouse gas (GHG) emission threshold. However, the emissions benefits of using biofuels are captured upstream of the tailpipe and there are no standardized chemical tests that allow someone to measure lifecycle emissions. There is a wide range of biofuel and those with lower associated

lifecycle emissions, such as cellulosic fuel, should be rewarded. However, investors are less likely to take on risk by investing in cellulosic fuel when the incentives to do so are ambiguous.



The RFS is intended to promote the biofuels economy,
Photo: ecowatch.com

The RFS is the largest driver of biofuel use in the United States, and one of the world's most aggressive biofuel policies. The RFS mandates the use of a certain amount of biofuel in our transportation infrastructure. There is no other option for regulated parties unless they want to pay heavy fines for non-compliance. To comply with the RFS, a regulated party must own a certain number of compliance certificates, called Renewable Identification Numbers (RINs) for each of the four previously mentioned fuel categories. RINs are generated by biofuel producers and typically sold along with the biofuel to obligated parties. RINs were seen as a market tool to ease the burden of compliance because they can be traded separately from the biofuel with which they were bought, and to provide another revenue stream for cellulosic fuel producers.

The problem is that there is very little cellulosic biofuel production. As a result the EPA is in the awkward position of having to mandate the use of a fuel that essentially does not exist. To ease this pressure the EPA has the authority to reduce the required volume of cellulosic fuel as prescribed by Congress in the RFS. This process of revising the volume requirements is referred to as the EPA's waiver authority. The EPA is supposed to set the revised volume mandate at the beginning of each calendar year, but this is an inherently uncertain process. To date, EPA has mandated cellulosic fuel use every year, but that fuel ultimately was not available, which required

additional Cellulosic Waiver Credits (CWCs), or waivers.

These waivers can be purchased instead of RINs directly from the EPA under certain circumstances. The problem with CWCs is that their price was set by Congress and is pegged to the price of gasoline. Its value per gallon is calculated as the maximum of either \$3.00 minus the price of gasoline or \$0.25. Waiver credits have been inexpensive in the past, and under gasoline price scenarios predicted by the Energy Information Administration, these credits will only continue to decrease in price and undermine the purpose of the RFS. At first cellulosic fuel will likely come at a premium, and that premium will be included in the price of RINs that producers would sell to obligated parties. Obligated parties would likely pay whatever that RIN price is because they must show compliance with the RFS, but because CWCs will be inexpensive, obligated parties will always choose a CWC over an RIN, stripping away a vital revenue stream for the new cellulosic fuel industry.

The subtitle of the Energy Independence and Security Act that created the RFS was called “Energy Security through Increased Production of Biofuels.” Congress has made it clear that the intent was to address security issues, but Congress was also interested in promoting the cellulosic biofuels industry in order to obtain environmental benefits. The existence of the waiver credit together with

the waiver authority undoes much of the work to incentivize such dramatic market change. As such, compliance with the RFS has essentially been a game between first generation biofuels (corn ethanol and biodiesel) and imported sugarcane ethanol from Brazil and cellulosic fuels have been unable to gain a market share. It is difficult to envision how the RFS, in its current form, can truly drive change towards cellulosic fuels, and the EPA has an uphill battle to climb in order to instill market confidence.

Adam Christensen is a National Science Foundation Science, Engineering and Education for Sustainability (SEES) Fellow and works with Johns Hopkins as a post-doctoral researcher. His research focuses on evaluating biofuel tax credits against key sustainability criteria and exploring opportunities that could make these credits more sustainable in the future. Adam graduated with his Ph.D. in Mechanical Engineering in 2009 from the Georgia Institute of Technology. Following graduation, he worked on Capitol Hill as an American Society of Mechanical Engineering Congressional Fellow and also was the Staff Engineer for the Appliance Standards Awareness Project, an energy efficiency advocacy group.

