



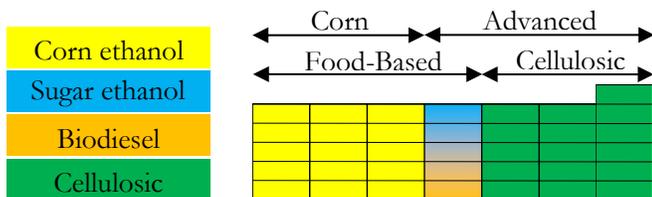
Advanced Biofuel Mandates Critical Decisions on Food vs. Fuel

TRULY ADVANCED BIOFUELS MUST MOVE BEYOND FOOD

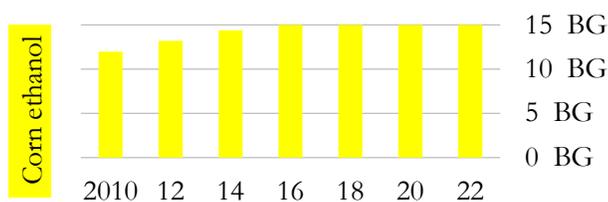
The Renewable Fuels Standard (RFS), a biofuels policy framework driving reduced oil use and a transition to lower carbon biofuels, is entering a critical phase. Over the next few years, implementation decisions made by the Environmental Protection Agency (EPA) will decide whether the RFS supports a transition to non-food based cellulosic biofuels, as originally intended, or drives an unsustainable expansion of food based biofuels. To avoid further stressing a food system already stressed by growing global population and climate change induced weather instability, such as the 2012 drought across much of the United States, future biofuel production must come primarily from non-food sources. **Delayed commercialization of cellulosic biofuel means it will take longer than originally anticipated to achieve these goals, but delays should not be used as an excuse to expand mandates for food based biofuels.**

Understanding the nested mandates

The RFS, enacted as part of the 2005 Energy Policy Act of 2005 and amended by the Energy Independence and Security Act of 2007, requires 36 billion gallons (BG) of biofuel to be blended into U.S. gasoline by 2022ⁱ. The RFS is structured as several nested mandates, each with its own eligibility criteria. The chart below shows the breakdown of the 36 BG target for 2022. Each box represents 1 billion gallons of annual production.



• **Corn ethanol** – In order to qualify for the RFS, conventional biofuels, predominantly corn ethanol, must demonstrate a 20% reduction in greenhouse gas emissions (GHGs) compared to gasoline, although most existing corn ethanol production facilities are grandfathered and do not need to meet this requirement. Corn ethanol production was already quite high when EPA finalized the rules for the RFS in 2010.

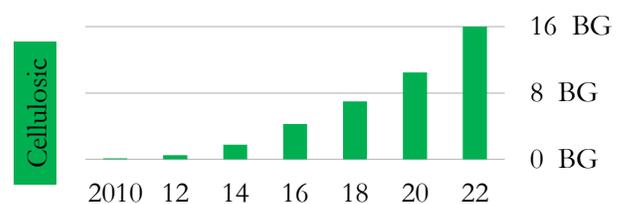


As the share of U.S. corn going to ethanol has grown (it is now about 40%) the impact of biofuels on food prices

has become quite significant. But corn ethanol has almost reached the RFS limit of 15 BG already. With 2011 production of almost 14 BGⁱⁱ, RFS mandates will not drive much further expansion of corn ethanol in the years ahead.

• **Advanced biofuels** – Advanced biofuels account for most of the growth of the RFS after 2012, and this category was intended to account for 21 out of 36 billion gallons in 2022. There are important subcategories of advanced biofuels which we will describe in turn.

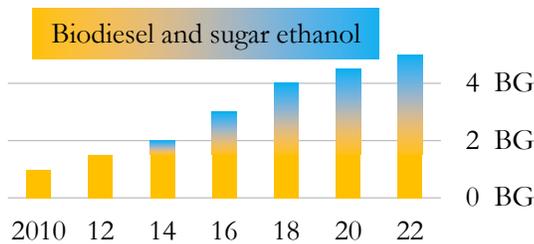
• **Cellulosic biofuel** – Cellulosic biofuels are made from indigestible parts of plants, which can be obtained from agricultural or household wastes, or fast growing trees or grasses. Because they are not made from food, these biofuels have a much smaller impact on food markets. To qualify as a cellulosic biofuel under the RFS, biofuels must meet at least a 60% reduction in GHG compared to gasoline.



The mandate for cellulosic biofuel was scheduled to begin at 100 million gallons (0.1 BG) in 2010 and expand to 16 billion gallons (BG) in 2022 with the caveat that the actual yearly mandate level be based on EPA assessments of projected production capacity. The actual commercialization is proceeding more slowly than

anticipated. A recent forecast by the U.S. Energy Information Administration (EIA) suggests that actual volumes available in 2022 will likely be at least 80% lower than 16 BG, leading to an actual mandate of about 2-3 BGⁱⁱⁱ. Achieving the targeted 16 BG is still possible, but it will take at least 5 years longer than anticipated, and the speed of scale-up will depend upon the stability of cornerstone policies like the RFS and other support.

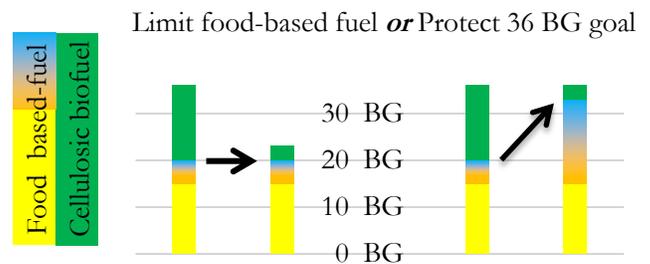
Sugarcane ethanol and biodiesel – Aside from cellulosic biofuel, the remaining 5 BG of advanced biofuels can be made from food crops, provided the biofuels meet a 50% GHG reduction compared to gasoline. EPA has determined that qualified non-cellulosic advanced biofuels include biodiesel made from vegetable oils (although not palm oil) and waste fats, and ethanol made from sugarcane. Other biofuels including ethanol made from grain sorghum or butanol made from sugar may also qualify as advanced biofuels, but for simplicity this category is designated sugar ethanol. The mandate for these non-cellulosic advanced biofuels is scheduled to grow from 1 BG in 2010 to 5 BG in 2022.



A certain portion of the advanced biofuel mandate is set aside specifically for biodiesel. This portion is flexible, and is set by EPA at a minimum of 1 BG in 2010 and 1.5 BG in 2012. Subsequent mandates are determined year to year based on availability and other criteria. While this biodiesel set aside means there is a minimum amount of the advanced mandate that can be satisfied by biodiesel, there is no maximum, and potentially the entire non-cellulosic advanced mandate can be met with biodiesel. For this reason the above illustrations show a graded bar, indicating uncertainty about how much of the advanced mandate will be met with biodiesel.

Expansion of food-based biofuel mandates

Because the commercialization and scale up of cellulosic biofuels is behind the original targets, EPA has an important decision to make. In theory, EPA could hold the total mandate for advanced biofuels unchanged, which would require food-based advanced biofuels like biodiesel or sugar ethanol to expand and replace the volumes of cellulosic biofuel. In practice, however, this would mean more than *tripling* the rate of growth of food based biofuels between 2013 and 2022. Instead EPA should exercise the authority Congress gave it, limiting the mandates for food-based biofuels at the levels directly specified in the RFS, thus protecting food production from additional competition.



How much food-based fuel can we afford?

Corn ethanol grew from 1.8 BG to 13.2 BG in the decade between 2001 and 2010^{iv}. The result was a run-up in prices for corn and other crops, a dramatic increase in food price volatility, and an acceleration of agricultural expansion around the world, especially in the tropics, to resupply the food lost to ethanol production. With food markets tighter now than they were in 2001^v, and 40% of U.S. corn already used for ethanol, the consequences of another decade of dramatic expansion of food based biofuels would be equally damaging.

This substitution of food based fuel for cellulosic biofuels will not meet the climate, energy, security, or economic goals of the RFS. To ensure the success of the Renewable Fuels Standard, the prudent course is to hold the line on food-based fuels, and accept that it will take longer than originally anticipated to bring cellulosic biofuels to scale and meet the full RFS targets.

ⁱ Federal Register / Vol. 75, No. 58 / Friday, March 26, 2010.

Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program. 14670-14904.

ⁱⁱ Renewable Fuels Association, Ethanol Statistics.

<http://www.ethanolrfa.org/pages/statistics>. Accessed

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ⁱⁱⁱ U.S. Energy Information Administration. Annual Energy Outlook 2012. <http://www.eia.gov/forecasts/aeo/>. Accessed

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^{iv} Renewable Fuels Association, Ethanol Statistics.

<http://www.ethanolrfa.org/pages/statistics>. Accessed

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^v Food and Agriculture Organization of the United Nations.

Food Price Index. <http://www.fao.org/worldfoodsituation/wfs-home/foodpricesindex/en/> Accessed 11/16/2012