

Proposed Changes to the Renewable Fuel Standard Program (RFS2)

June Update



Agenda

- Who's interested?
- Background and statutory requirements
- Lifecycle impacts and GHG thresholds
- Other Key Issues
- Overview of Impacts
- Next Steps on RFS2
- Blendwall

Setting the Stage

- **On May 5, Administrator Jackson signed the Renewable Fuel Standard (RFS2) proposal**
 - Proposal interprets revisions to the original EPA Act RFS program, as included in the Energy Independence and Security Act (passed in December 2007)
 - Lays out these proposed changes, including alternative options, for public comment
- **RFS2 Program Will Result in a Number of Important and Precedent-Setting Changes**
 - Large market forcing growth in the renewable fuels market - to 36 Bgal
 - Primary increase is in advanced biofuels and cellulosic biofuels
 - Preserves 15 bill gal for conventional biofuels
 - Grandfathered from the GHG thresholds
 - Significant benefits for
 - Greenhouse gases – Significant benefits from Advanced Biofuels
 - Energy security
 - Agriculture

Primary Changes Required by EISA

- **Energy Independence and Security Act (December 2007) required changes to the RFS program**
 - Significantly increased volumes of renewable fuel
 - Separation of the volume requirements into four separate categories of renewable fuel: cellulosic biofuel, biomass-based diesel, advanced biofuel, total renewable fuel
 - Changes to the definition of renewable fuels to include minimum lifecycle GHG reduction thresholds and grandfathering of some volume
 - Restrictions on the types of feedstocks that can be used to make renewable fuel, and the types of land that can be used to grow feedstocks
 - Inclusion of specific types of waivers and EPA-generated credits for cellulosic biofuel

- **The changes required by EISA also precipitated a number of other changes that we are proposing and/or taking comment on, for example:**
 - RIN bank (EPA Moderated Transaction System - EMTS)
 - Production Outlook Reports
 - Alternative approach to designation of obligated parties
 - Alternative approach to transfer of RINs with batches

What are the New Standards?

■ Four Separate Standards

- **Cellulosic Biofuel: 16 billion gallons by 2022**
 - Renewable fuel produced from cellulose, hemicellulose, or lignin
 - E.g., cellulosic ethanol, BTL diesel, green gasoline, etc.
 - Must meet a 60% lifecycle GHG threshold
- **Biomass-Based Diesel: 1 billion gallons by 2012 and beyond**
 - E.g., Biodiesel, “renewable diesel” if fats and oils not co-processed with petroleum
 - Must meet a 50% lifecycle GHG threshold
- **Advanced Biofuel: Minimum of 4 billion additional gallons by 2022**
 - Essentially anything but corn starch ethanol
 - Includes cellulosic biofuels and biomass-based diesel
 - Must meet a 50% lifecycle GHG threshold
- **Renewable Biofuel: Up to 15 billion gallons of Other Biofuels**
 - Ethanol derived from corn starch – or any other qualifying renewable fuel
 - Must meet 20% lifecycle GHG threshold - Only applies to fuel produced in new facilities

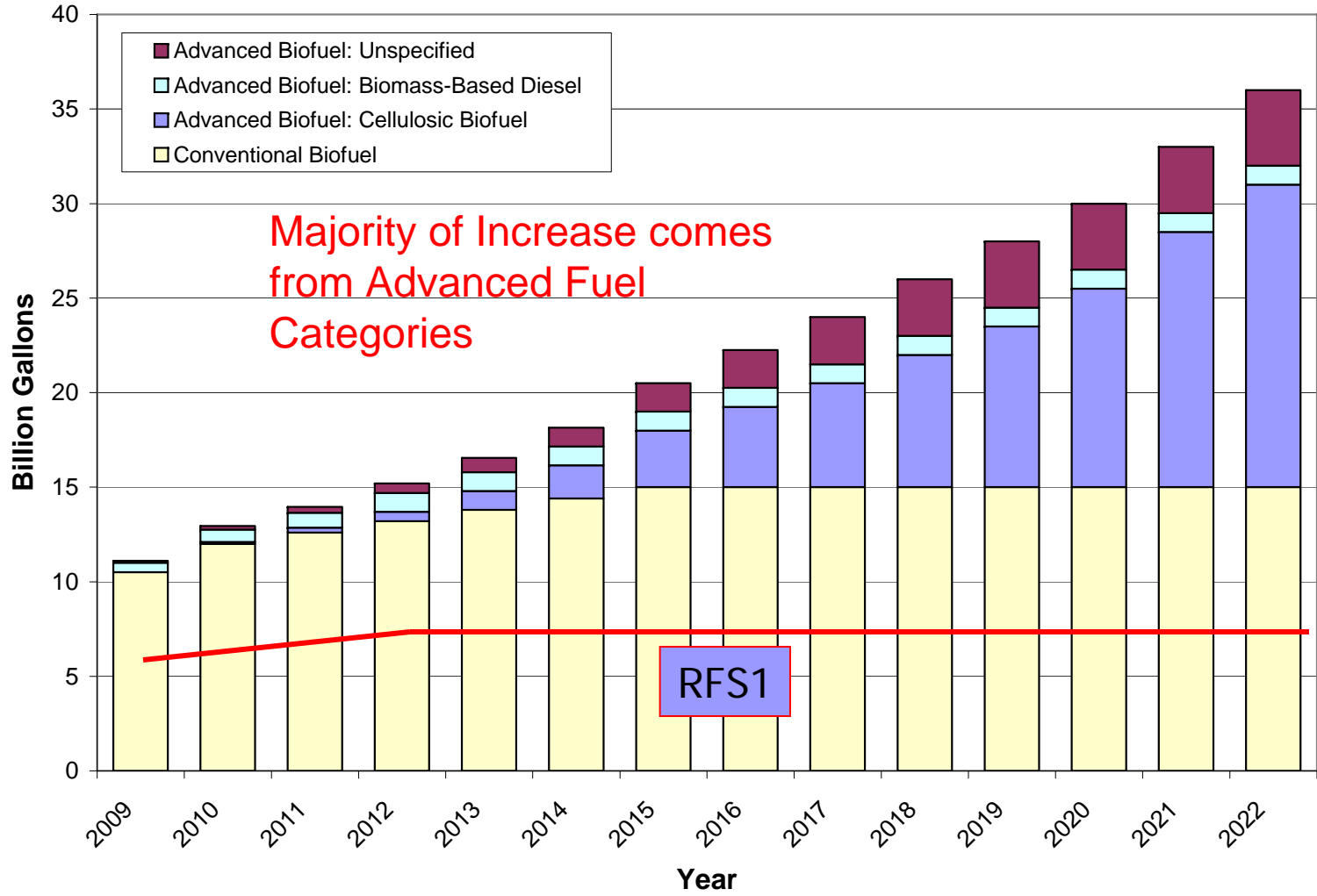
NOTE: Existing biofuel facilities not required to meet conventional GHG threshold

- **EISA language permits EPA to adjust the lifecycle GHG thresholds by as much as 10% -- (60% to 50%; 50% to 40%; 20% to 10%)**
 - **Based on the market availability of fuels that could count as advanced biofuel, we are proposing that the GHG threshold for advanced biofuel be adjusted to 44% or as low as 40%**

RFS2: Nested Standards (billions of gallons)

Year	Conventional Biofuels (Grandfathered or 20% Reduction)	Advanced Biofuel				Total Renewable Fuel
		Biomass-Based Diesel (50% Reduction)	Non Cellulosic Advanced (50% Reduction)	Cellulosic Biofuel (60% Reduction)	Total Advanced Biofuel	
2006	4.00					4.0
2007	7.70					4.7
2008	9.00					9.0
2009	10.50	0.5	0.1		0.6	11.1
2010	12.00	0.65	0.2	0.1	0.95	12.95
2011	12.60	0.80	0.3	0.25	1.35	13.95
2012	13.20	1.0	0.5	0.5	2.0	15.2
2013	13.80	1.0	0.75	1.0	2.75	16.55
2014	14.50	1.0	1.00	1.75	3.75	18.15
2015	15.00	1.0	1.50	3.0	5.5	20.5
2016	15.00	1.0	2.00	4.25	7.25	22.25
2017	15.00	1.0	2.50	5.5	9.0	24.0
2018	15.00	1.0	3.00	7.0	11.0	26.0
2019	15.00	1.0	3.50	8.5	13.0	28.0
2020	15.00	1.0	3.50	10.5	15.0	30.0
2021	15.00	1.0	3.50	13.5	18.0	33.0
2022	15.00	1.0	4.00	16.0	21.0	36.0

Volume Changes Over Time



Lifecycle GHG Emissions

- **Lifecycle GHG analysis is integral to the new RFS2 Standards**
 - Without a determination of whether a fuel does or does not comply with the thresholds, the program cannot be implemented

“**The term ‘lifecycle greenhouse gas emissions’ means the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.**”

Lifecycle GHG Thresholds

- **GHG thresholds are defined as the % reduction in lifecycle GHGs for a renewable fuel in comparison to the 2005 baseline gasoline or diesel that it displaces**
 - Lifecycle GHG estimates are only used to categorize renewable fuels into the four standards, not to value them

- **We have conducted lifecycle analysis for a variety of renewable fuel pathways**
 - Additional analysis for final rule is expected to expand the list of pathways and revise input assumptions based on new information
 - Also proposing a "default" mechanism that would allow some renewable fuels to temporarily generate RINs even if we did not explicitly analyze their lifecycle GHG impacts

- **While each renewable fuel pathway has a unique lifecycle GHG emissions impact in grams/mmBtu, for RFS2 regulatory purposes these lifecycle emissions are used only to compare each pathway to the applicable threshold and assign it to one of the four renewable fuel categories**

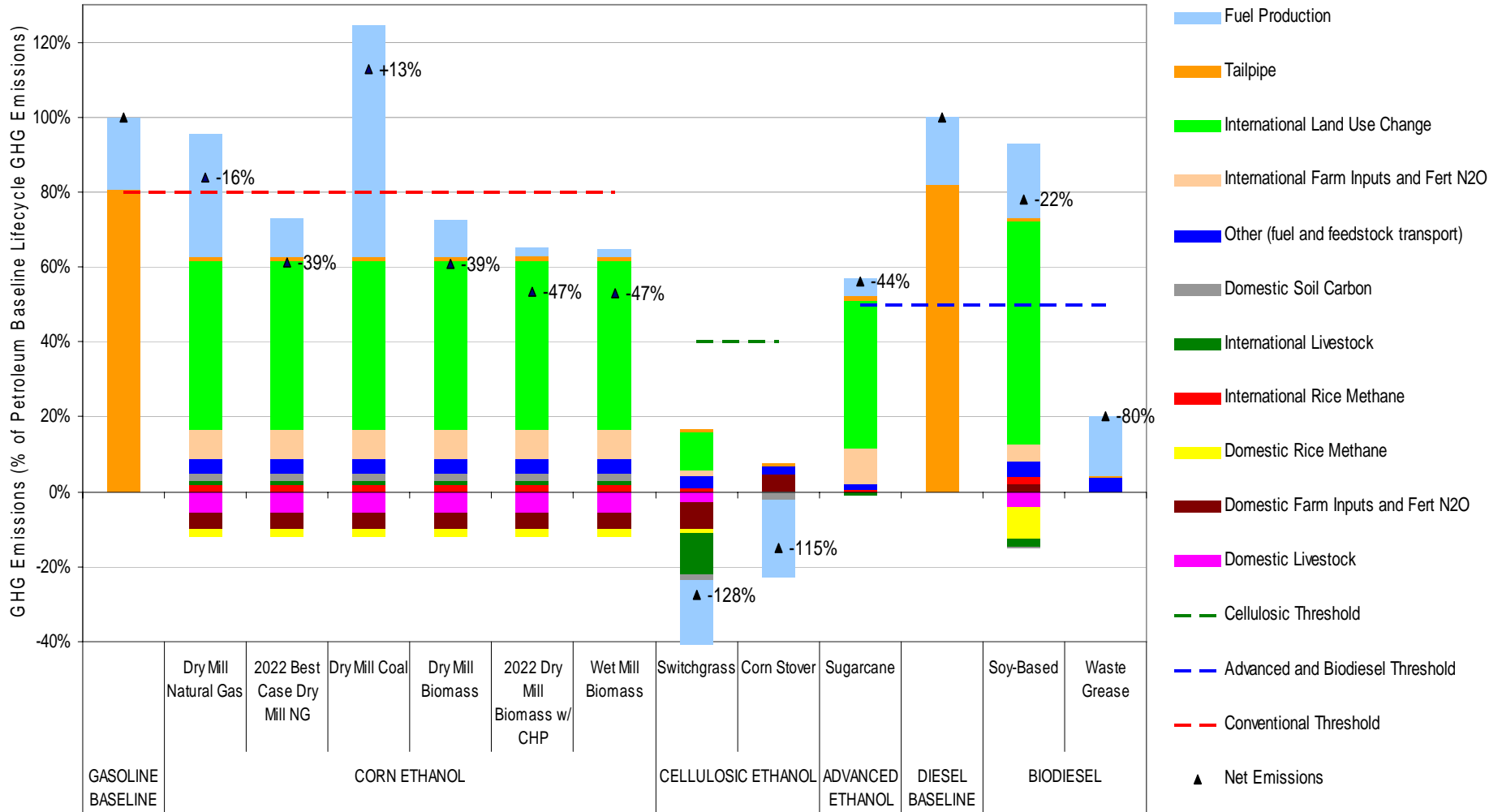
Key Factors in Land Use Assessment

- **Analysis revealed which factors have the most significant impact on the final results including:**
 - **What type of land is converted?**
 - Use of historic satellite data to project type of land converted
 - Alternative approach to use economic models to predict type of land converted
 - **What time period to consider and whether to apply a discount rate to emissions over time?**
- **We conducted additional sensitivity analyses around these and other factors**

Presentation of LCA Results in the Proposal

- **Thorough description of our new methodology and results**
- **Acknowledges uncertainty, particularly for land-use change impacts**
- **Presents the results, along with various sensitivity runs**
 - Corn ethanol assessments for different volumes, different years
 - Different assumptions for land use impacts
 - Bracketing pasture replacement (zero to 100%)
 - Type of land converted (assume 100% grassland)
 - Impact of foregone sequestration over time
- **Likewise we present several options for valuing the impacts over time**

Biofuel Lifecycle GHG Results: *Different Pathways with 2% Discount Rate – 100 years* (2022 Values)



Other Important Issues

- **Peer Review: Conducting a formal peer review (between proposal and final rule) of key elements of our lifecycle analysis:**
 - According to formal peer review guidelines
 - Independent third-party contractor selecting reviewers
 - Four Key Aspects: Land use modeling (use of satellite data/ land conversion GHG emission factors): estimates of GHG emissions from foreign crop production; Methods to account for the variable timing of GHG emissions; How models are used together for LCA estimates
 - Making peer review results available to public

- **Grandfathering: All biofuel facilities (domestic and international) that “commenced construction” prior to EISA are grandfathered:**
 - Not required to meet the minimum 20% GHG threshold in-order to comply
 - Does not apply to other higher / advanced category GHG thresholds
 - Proposing baseline volume would be grandfathered indefinitely - Seeking comments on a range of other applications and approaches
 - Expect at least 15 billion gallons will be grandfathered
 - Corn-ethanol production (~15 Bgal); Most biodiesel (~2 Bgal); Most sugarcane (~5 Bgal)

- **Renewable Biomass: EISA restricts types of renewable fuel feedstocks and land that feedstocks can come from:**
 - Ag land must have been cleared or cultivated prior to Dec 19, 2007 & actively managed, fallow, and non-forested
 - Woody biomass from federal land is not allowed, except from wildfire areas
 - Requires new tracking of feedstocks from point of production to renewable fuel producers
 - Proposing renewable fuel producers be required to maintain records to support decision to generate, or not to generate RINs for a given batch of renewable fuel
 - Seek comments on wide variety of other approaches

- **Implementation Timing – Intend January 1, 2010 – But seeking comment on Alternatives – Contingent upon current schedule being met**

RFS2 Impacts Summary

■ GHG Emissions from Transportation

- Annual average reduction of approximately 160 million tons CO2 equivalent per year.
- Reductions equivalent to taking about 24 million vehicles off the road.

■ Impacts on Overall Petroleum Consumption in 2022

- 36 billion gallons of renewable fuel will displace about 11% of gasoline and diesel consumption, with most reductions coming from reduced petroleum imports

■ Fuel Cost Impacts (Nationwide Average based on low and high crude costs)

- Gasoline costs would increase by about 2.7 and 10.9 cents per gallon by 2022.
- Diesel fuel costs could experience a small cost reduction of 0.1 cents per gallon, or increase by about 1.2 cent per gallon
- Increases in gasoline and diesel fuel costs are equivalent to \$4 billion to \$18 billion in 2022

■ Energy Security

- Estimate, the total energy security benefits associated with a reduction of U.S. imported oil is \$12.38/barrel.
- Based upon the \$12.38/barrel figure, total energy security benefits associated with this proposal were calculated at \$3.7 billion

■ Consumer Food Costs

- Estimate U.S. food costs would increase by \$10 per person per year by 2022
- Net U.S. farm income would increase by \$7.1 billion dollars (10.6%)

■ Criteria and Air Toxics Pollutant Impacts

- Air quality analysis for the FRM

Preliminary Emissions Impacts

Pollutant	Change in total U.S. inventory ¹ in 2022 in comparison to RFS1 mandate
NOx	2.5 to 3.0%
HC	0.6%
PM10	1.0%
PM2.5	0.3%
CO	-3.1 to -5.8%
Ethanol	29 to 33%
Acetaldehyde	28 to 38%
Benzene	-1.5 to -3.5%
GHG	-150 to -160 million tons per year on average (over 30 to 100 years respectively)

¹ Includes all upstream and downstream emissions

Next Steps

- **Current 60-day public comment period scheduled to close July 27th – Entertaining request for Extension**
 - Possible implications on implementation

- **Public hearing on proposal planned for June 9 in Washington, DC - Audio cast**

- **Two-day lifecycle workshop (June 10-11 in Washington, DC) - Webcast**
 - The intent of this workshop is to help ensure a full understanding of our lifecycle analysis, the major issues identified, and the options discussed

- **Completion of peer reviews of lifecycle methodology**

- **Additional Implementation workshops and meetings**

The "Blend Wall"

- Analyses for the NPRM were based on an assumption of 34 bill gal ethanol by 2022 used as E10 and E85
- By 2013 at the latest, we expect that all gasoline in the U.S. will be E10
 - 14 - 14.5 bill gal of ethanol
- There are three pathways to meet the RFS2 mandated volumes:
 - Additional ethanol will need to be consumed as E85 in flex-fuel vehicles (FFVs); more FFVs, more E85 stations, better E85 pricing
 - Non-ethanol biofuels - several promising technologies
 - Mid-level ethanol blends as a temporary measure
- The proposal discusses and analyzes the various legal, practical, and economic issues associated with all three pathways

Questions



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