



# RFS-2 Final Rule

# EPA Release of RFS2

- The U.S. Environmental Protection Agency (EPA) released its final rule for the expanded Renewable Fuels Standard (RFS2) on February 3, 2010.
- Based on additional internal analysis, public comments from stakeholders, and comments from peer reviewers, the EPA made numerous modifications to the proposed regulation.
- The final rule is “workable” for the ethanol industry, though the ILUC provisions remain problematic

# EPA took a sound approach to grandfathering

- Grandfathering applies to ethanol facilities that started production in CY08 and CY09 that are powered by natural gas or biomass
- Facilities are grandfathered indefinitely
- 5% tolerance factor
- Expansions beyond 105% of permitted capacity must meet 20% threshold

# Registration, Recordkeeping, Reporting

- RFS2 significantly expands requirements for producers
- Some requirements seem extraneous and duplicitous, e.g.:
  - Reporting of RIN pricing
  - Reporting of ethanol prices
  - P.E. certification of plant designs
  - Requirement to submit “outlook” reports

# EPA took a more sensible approach to “Renewable Biomass” provisions

- The EPA finalized an “aggregate compliance” mechanism for determination of compliance with the renewable biomass requirement that biofuel feedstocks (crops and crop residues) must come from “existing cropland.”
- EPA will assume all crops and crop residues used for biofuels came from existing cropland as long as total cropland does not expand beyond a baseline level of 402 million acres (equivalent to 2007 total cropland).
- However, EPA decided against including rangeland in the set of agricultural lands from which qualifying renewable biomass may be sourced.

# EPA Retained Equivalency Values

- The final rule gives “extra credit” to certain biofuels for RIN generation based on energy content
  - Ethanol = 1.0
  - Butanol = 1.3
  - Biodiesel = 1.5
  - Renewable diesel = 1.7
- Nested standards should have eliminated the need for equivalence values
- Result is that less than 36 bgy will be used to comply with RFS (probably closer to 30-31 bgy)

# EPA's lifecycle GHG analysis is improved, but ILUC provisions still need work

- Most controversial area of RFS2 rule
- Crop-based biofuels still penalized for ILUC
- However, ILUC impacts for corn ethanol reduced by half
  - Proposed rule = +5% GHG increase for avg. corn ethanol\*
  - Final rule = -21% GHG reduction for avg. new corn ethanol\*
- “New” corn ethanol assumed to comply with -20% GHG reduction threshold
- ***The -21% reduction would be -52% without ILUC***

\*30 years/0%

# Positive Changes to LCA

- *Addition of factor for impact of price on yield improvements*
- *Revised distillers grains assumptions*
- *Addition of new Brazil module*
- *Expansion of satellite data*
- *Addition of available land types (Idle cropland and forest)*
- *Revised assumptions on foregone sequestration*
- *Several others*

# Negative Changes to LCA

- ***Timeframe for Accounting of Emissions:*** For its final rule analysis, the EPA used a 30-year timeframe to account for lifecycle GHG emissions, versus the 100-year (2% discount) timeframe used for the proposed rule. This change likely had the greatest impact on the final GHG reduction results for corn ethanol and other biofuels.
- If the EPA had maintained its 100-year timeframe (and 2% discount rate) for the final rule analysis, the corn ethanol GHG reduction would have been approximately **35% instead of 21%**.
- ***Fertilizer Assumptions and Modeling:*** EPA revisions on emissions from fertilizer production and use resulted in significant increases in emissions from the domestic and international agriculture.
- ***No Attempts Made to Capture Indirect Emissions for Gasoline Baseline***

# The Net Effect of LCA Changes

- The aggregate effect of these improvements (and others) was to reduce *by half* the emissions from international land use changes (from 60.4 g/MJ to 30.3 g/MJ) that are included by the EPA in the corn ethanol lifecycle.

All figures in: grams CO<sub>2</sub>equivalent/megajoule (g/MJ)  
Timeframe: 30 years (0% discount)

LIFECYCLE PHASE ↓	Final Rule	Proposed Rule	Change	Likely Reason(s) for Change
Net Domestic Agriculture	3.8	-11	14.8	Updated fertilizer production emissions; updated N <sub>2</sub> O emissions (?)
Net International Agriculture	11.4	9.9	1.5	Updated fertilizer production emissions; updated fertilizer application
Domestic Land Use Change	-1.9	2.9	-4.8	DGS assumptions; price-induced yield increases; Brazil de-aggregation; more pasture/less forest conversion; FASOM forestry module activated; Timeframe for satellite data extended; foregone sequestration assumptions revised
International Land Use Change	30.3	60.4	-30.1	
Fuel Production**	26.5	30.9	-4.4	Assumptions on fractionation/oil sep/DGS
Fuel and Feedstock Transport	3.8	3.8	0	N/A
Tailpipe Emissions	0.9	0.8	0.1	N/a
<b>NET TOTAL EMISSIONS</b>	<b>74.8</b>	<b>97.7</b>	<b>-22.9</b>	
GASOLINE	92.9	93.3	-0.4	Used NETL analysis rather than GREET

\*\*Final Rule=natural gas dry mill; 63% DDG/37% WDG; with fractionation

\*\*Proposed Rule=natural gas dry mill; 100% DDG

# Handling of Other Biofuels

- Brazilian sugarcane ethanol benefited disproportionately from the EPA's revised lifecycle analysis.
- Sugarcane ethanol's international ILUC emissions *dropped from 56 g/MJ to just 3.8 g/MJ (93%)*
  - *Brazil sugarcane expansion is assumed to occur on marginal lands with low carbon storage*
  - *U.S. corn and soybean expansion is assumed to induce cultivation of former pasture in Brazil with pasture being replaced in ecosystems with relatively higher C storage*
- EPA found butanol reduces GHGs by 31% relative to gasoline. Assumptions and sources are unclear