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The New U.S. Renewable Fuel Standard: Slow Movements Towards Sustainability

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Introduction

In 2005, the U.S. Congress adopted the first federal Renewable Fuel Standard (RFS).[1] The RFS required gasoline importers, blenders, and refiners to blend up to 4 billion gallons of biofuels into gasoline in 2005 and to increase the amount to 7.5 billion gallons by 2012.[2] The RFS did better than expected, leading Congress to include in the Energy Independence and Security Act of 2007[3] (EISA) increased biofuel blending requirements. Under EISA, the petroleum industry must, by 2022, blend at least 36 billion gallons of biofuels into gasoline.[4] Industry experts have little doubt that the biofuel industry will be able to satisfy this requirement. To the extent U.S. biofuel policy aims to promote domestic energy production, it appears to be well on its way.

However, U.S. biofuel policy also aims to mitigate climate change by reducing greenhouse gas emissions,[5] and on this front, it has not lived up to its promises. In

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[1] Energy Policy Act of 2005, 42 U.S.C. § 7545(o) (2006).

[2] 42 U.S.C. § 7545(o)(2)(B)(i) (2006).

[3] Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 202, 121 Stat. 1492, 1522 (2007).

[4] Ibid.

[5] Climate change, also called global warming, results from an overabundance of greenhouse gases in the atmosphere. The most important naturally occurring greenhouse gases are carbon dioxide, methane, and nitrous oxide. While these gases occur naturally, human activities, including fossil fuel combustion, deforestation, and agricultural practices, have increased the concentrations of greenhouse gases in the atmosphere and thus increased their heat-trapping potential. See further: EPA, *Climate Change - Basic Information* (available at http://www.epa.gov/climatechange/ basicinfo.html).

theory, biofuels should be 'carbon-neutral,' because the amount of carbon dioxide they release during combustion should be offset by the amount of carbon dioxide the plants sequester during their growth.[6] However, these direct emissions offsets do not necessarily account for all greenhouse gas emissions that could directly result from agricultural and production practices.[7] For example, fertilizer use and soil tilling can result in high emissions of nitrous oxide, a potent greenhouse gas.[8] Converting corn starch into ethanol usually requires a substantial amount of energy, and if coal-fired power plants supply the energy, ethanol production can emit large quantities of greenhouse gases.[9] Thus, depending upon various factors, direct emissions from biofuels may exceed emissions from fossil fuels.

More importantly, when the global consequences of U.S. agricultural and biofuels policies are considered, crop-based biofuels – and corn ethanol, in particular – appear likely to cause significant increases in greenhouse gas emissions.[10] The United States is one of the world's largest exporters of agricultural crops, and many developing countries depend on U.S. food imports to meet their basic food needs.[11] U.S. biofuel policy has prompted many agricultural interests to shift away from food production in favor of domestic biofuel production.[12] This, combined with several other factors, has contributed to soaring global food prices and food shortages in

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[6] Union of Concerned Scientists, *Biofuels: Biodiesel Basics* (2007), (available at http://www.ucsusa.org/clean_vehicles/technologies_and_fuels/biofuels/biodiesel-basics.html).

[7] P.J. Crutzen et al, 'N_2O Releasing from Agro-Biofuel Production Negates Global Warming Reduction by Replacing Fossil Fuels', (2002) 7 *Atmos. Chem. & Phys.,* 11191, at 11197, (global warming effects from corn ethanol would be 0.9-1.5 worse due to emissions of nitrous oxide). Some scientists calculate that corn ethanol will lower greenhouse gas emissions by 11-39%, even when emissions from ethanol refining and inputs of petroleum and fertilizer are factored in (B.A. Babcock et al, 'Is Corn Ethanol a Low-Carbon Fuel?', (2007) 13 *Iowa Ag. Rev.* 1-3, at 10. However, this study considered only direct inputs and emissions associated with ethanol production and did not consider the indirect effects associated with land clearing (ibid).

[8.] Ibid, at 11197.

[9] EPA, Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 74 Fed. Reg. 24,904, 25,042 (proposed May 26, 2009) (to be codified at 40 C.F.R. pt. 80) [hereinafter EPA RFS2 Proposal].

[10] *Friends of the Earth Europe, Agrofuels: Fueling of Fooling Europe? The Problems of Using Plant-Based Oils in Power Stations and Vehicles*, at 2-3 (*available at* http://www.foe.co.uk/resource/briefings/agrofuels_fuelling_or_fool.pdf).

[11] *United Nations Environment Programme, Towards Sustainable Production and Use of Resources: Assessing Biofuels*, 23 (2009) [hereinafter UNEP] (*available at* http://www.unep.org/pdf/Assessing_Biofuels-full_report-Web.pdf); J. Kanter, 'Europeans Reconsider Biofuels Target', *N.Y. Times*, Jul. 8, 2008 (available at http://www.nytimes.com/2008/07/08/business/worldbusiness/08fuel.html).

[12] U.N. Food and Agric. Org., High-Level Conference on World Food Security: The Challenges of Climate Change & Bioenergy, *Soaring Food Prices: Facts, Perspectives, Impacts, and Actions Required*, 18, U.N. Doc. HLC/08/INF/1 (June 3-5, 2008) [hereinafter *FAO Soaring Food Prices*].

developing countries.[13] In response, many developing countries have begun or will begin clearing forests and peatlands to increase their own food production.[14] Other countries have begun clearing land to produce their own biofuels to export to the United States and Europe.[15] These land use changes, particularly where they would convert rainforests and peatlands into agricultural lands, could release massive amounts of carbon dioxide and other greenhouse gases.[16] One study found that U.S. biofuels policy would 'double greenhouse gas emissions over 30 years and increase greenhouse gases for 167 years.'[17] Many other studies have concluded that any U.S. biofuels policy that allows biofuels to come from food crops will result in more greenhouse gas emissions than it will prevent.[18] Policymakers have therefore begun to propose changes to U.S. biofuels policy to align it with its overarching goals of reducing emissions.

Since its creation, the federal RFS has had some provisions that could promote non-food biofuels and mitigate the effects associated with indirect land use changes spurred by corn ethanol production and development of other crop-based biofuels. However, none achieved meaningful results. For example, the 2005 Energy Policy Act (EPAct) attempted to promote the use of biofuels other than corn ethanol through various market mechanisms that allow producers to buy and trade credits, rather than actual biofuels, to meet their RFS requirements.[19] Under the 2005 EPAct, the Environmental Protection Agency (EPA) assigned different values (called "equivalence values") to various biofuels based on their energy values and environmental benefits.[20] The 2005 EPAct itself assigned cellulosic biofuels[21] and biofuels derived from waste an equivalency value 2.5 times higher than corn

[13] Ibid, at 18 (explaining the linkages between agriculture and fuel prices), 22 (discussing how corn ethanol production in the United States will draw down U.S. corn supply), and 33–63 (discussing impacts of high food prices on developing countries). See further: *United Nations Food and Agricultural Organization, The State of Food and Agriculture, Biofuels: Prospects, Risks and Opportunities*, 43-44 (2008) [hereinafter *FAO Biofuels Report*].
[14] *FAO Biofuels Report* (n.13), at 44–54.
[15] *UNEP* (n.11), at 63–65.
[16] *UNEP* (n.11), at 67–68.
[17] T. Searchlinger et al, 'Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land Use Change', (2008) 319 *Sci.*1238.
[18] J. Fargione et al, 'Land Clearing and the Biofuel Carbon Debt', (2008) 319 *Sci.* 1235.
[19] Regulation of Fuels and Fuel Additives: Renewable Fuel Standard Program, 72 Fed. Reg. 23,900, 23,904 (May 1, 2007) [hereinafter EPA RFS1 Final Rule].
[20] Ibid, at 23,909 and 23,919–22.
[21] Cellulosic ethanol is derived from plant materials, including wood waste, corn stover (leaves, stalks, and cobs), and other plant parts. Cellulosic ethanol may produce seven to eight times more energy than corn starch, and it would not affect food supply. However, technology to produce cellulosic ethanol has not developed to a point where cellulosic ethanol production is commercially viable. L. Geyer et al, 'Ethanol, Biomass, Biofuels and Energy: A Profile and Overview', (2007) 12 *Drake J. Agric. L.* 61, at 73–74.

ethanol.[22] In other words, an oil producer, importer, or refiner would need to purchase only one gallon of waste-derived fuel for every 2.5 gallons of corn ethanol to meet its RFS. EPA assigned other biofuels equivalence values that ranked them above corn ethanol.[23] Yet, despite the higher equivalence values, corn ethanol has continued to dominate the biofuels industry because subsidies and tax breaks make corn ethanol much cheaper than other biofuels.[24] Thus, the market approach under the RFS proved inadequate to spur production of biofuels with lower greenhouse gas emissions.

More recently, EISA has presented EPA with new opportunities to improve U.S. biofuels policy and reduce resulting greenhouse gas emissions. Most significantly, EISA mandates the use of new types of biofuels, including cellulosic and other 'advanced biofuels' that do not come directly from food crops and that will likely result in far fewer greenhouse gas emissions.[25] In addition, all new renewable fuel production must achieve greenhouse gas emissions reductions of 20%, compared to baseline emissions from fossil fuels.[26] This 20% requirement would apply to most new corn ethanol produced in facilities built after December 31, 2009.[27] These changes could significantly improve the environmental benefits of biofuels at some point in the future.

However, EISA and EPA's recent regulation implementing the new biofuel requirements will grandfather existing corn ethanol production from the greenhouse gas reductions requirement, perhaps indefinitely.[28] Based on EPA's estimates, the grandfathering provision will allow existing facilities to produce about 15 billion gallons annually of corn ethanol,[29] and will therefore allow corn to continue its dominance over the U.S. biofuels industry for years to come. Thus, while EISA signals a significant shift in biofuels policy toward more environmentally beneficial

[22] EPA RFS1 Final Rule (n 19) 23,909; 42 U.S.C. § 7545(o)(4) (2006).
[23] EPA RFS1 Final Rule (n.19) 23,921.
[24] R.F. Mann & M.L. Hymel, 'Moonshine to Motorfuel: Tax Incentives for Fuel Ethanol', (2008) 19 *Duke Envtl. L. & Pol'y F.* 43, at 45.
[25] EPA RFS2 Proposal (n.9).
[26] EPA RFS2 Proposal (n.9) 24,924.
[27] EPA, Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 75 Fed. Reg. 14,670, 14,688 (Mar. 26, 2010) (to be codified at 40 C.F.R. pt. 80) [hereinafter EPA RFS2 Final Rule].
[28] Ibid.
[29] EPA RFS2 Final Rule (n 27) 14,746. EPA calculated that facilities online as of November 2009 had the capacity to produce more than 12 billion gallons. It further estimated that 11 new facilities and 2 facility expansions – all of which were under construction and thus subject to the grandfathering provisions – would come online and increase overall corn ethanol production to 15 billion gallons.

biofuels, it does not go far enough to limit the existing harmful effects of corn ethanol production.

This article briefly discusses the development of U.S. biofuels policy and recent changes to the RFS that require the EPA to consider lifecycle greenhouse gas emissions in designing renewable fuels policy. The article first discusses how the market-based efforts to promote advanced biofuels under RFS1 failed, likely because subsidies for corn ethanol dwarf the market values of biofuels credits. The article then describes the changes in RFS2. It first explains how Congress' express mandates for advanced biofuels production will drive increased investment in fuels that will cause fewer emissions of greenhouse gases. It then describes a major shortcoming of RFS2, which exempts existing corn ethanol production facilities from the requirement that biofuels reduce greenhouse gas emissions. The article argues that this grandfathering provision, combined with EPA's assessment of lifecycle greenhouse gas emissions from new corn ethanol facilities, has the potential to exempt both old and new corn ethanol production from the emissions reductions requirements and thus perpetuate problems associated with corn ethanol production.

Despite these problems, the article concludes that RFS2 represents a significant step towards a sustainable biofuels policy that seeks to reduce greenhouse gas emissions and avoid food crops as a source of fuel. These changes signal an awareness on behalf of the U.S. Congress and the EPA that biofuel production can cause environmental and social problems. The initial requirements in RFS2 may lead to a more progressive biofuels policy that avoids the unintended consequences of biofuel production.[30]

The First Renewable Fuel Standard

Congress passed the first national renewable fuel standard in 2005 as part of its expansive energy bill.[31] The heart of RFS1 consisted of mandatory volume requirements, establishing the amount of renewable fuels that importers, refiners, and blenders (collectively, obligated parties) must add to motor vehicle fuels between

[30] Environmental organizations and industry groups have filed separate challenges to RFS2. Environmental organizations challenge EPA's conclusions that new corn ethanol production will meet the 20% emissions reduction requirement, while industry groups challenge the new rule as overly stringent. *Renewable Fuel Standard in Legal Crosshairs,* Environment News Service, (May 25, 2010) (available at http://www.ens-newswire.com/ens/may2010/2010-05-25-092.html).

[31] Energy Policy Act of 2005, 42 U.S.C. § 7545(o) (2006).

2006 and 2012.[32] Beginning in 2006, obligated parties collectively were required to add 4 billion gallons of renewable fuels, and by 2012, that amount increased to 7.5 billion gallons.[33] After 2012, RFS1 gave EPA discretion to establish new volume requirements, so long as the volumes did not fall below the 2012 standards.[34]

Congress directed the EPA to establish a credit trading system to provide flexibility for obligated parties to meet the volume mandates established under the law.[35] To implement this trading scheme, EPA assigned each gallon of produced or imported renewable fuel a Renewable Identification Number (RIN).[36] Whenever a party produced or imported renewable fuel, it received a unique RIN assigned to the batch of fuel produced.[37]

RINs, however, did not carry equal value under RFS1. In an attempt to incentivize development of cellulosic and waste-derived biofuels, Congress assigned these fuels equivalence values 2.5 times the value of corn ethanol.[38] Under this system, each gallon of ethanol would receive a RIN worth 1, but each gallon of waste-derived biofuel would have a RIN worth 2.5.[39] EPA, in turn, followed Congress' lead by assigning other biofuels different equivalence values, all of which were higher than the baseline value assigned to corn ethanol.[40] In theory, these higher equivalence values should have increased investment in and production of biofuels other than corn ethanol.[41] In reality, the equivalence values had no effect on corn ethanol production, because subsidies for corn ethanol dwarfed the market values of the RINs.[42] For example, in 2006, subsidies for corn ethanol equaled $1.06 to $1.38 per gallon,[43] while RIN values for biofuels have never exceeded 6.5 cents ($0.065) per credit.[44] Even when the highest equivalence value of 2.5 applies, the market value

[32] EPA RSF1 Final Rule (n.19) 23,903 tbl.I.B.-1.
[33] Ibid.
[34] EPA RSF1 Final Rule (n.19), at 23,912.
[35] Ibid, at 23,909.
[36] Ibid, at 23,908 and 23,929–936.
[37] Ibid.
[38] EPA RSF1 Final Rule (n.19) at 23,920–921.
[39] Ibid. Crude-based renewable fuels, which are not biofuels, received the same value as corn ethanol. EPA RSF1 Final Rule (n.19) at 23,921.
[40] EPA RSF1 Final Rule (n.19) at 23,918–921.
[41] Ibid.
[42] This article does not discuss the subsidies in depth, due to space limitations. For a more extensive discussion of the interplay between subsidies and corn ethanol's dominance, please see the longer article on which this shorter piece is based (11 *Vt. J. Envtl. L.* 1 (2010)).
[43] J.A. Sautter et al, 'Construction of a Fool's Paradise: Ethanol Subsidies in America', (2007) *Sustainable Dev. L. & Pol'y* 26 (describing subsidies, tariffs, tax credits, and legislation designed to promote ethanol production and use).
[44] Notice of Decision Regarding the State of Texas Request for a Waiver of a Portion of the Renewable Fuel Standard, 72 Fed. Reg. 47,168, 47,175 (Aug. 13, 2008).

for advanced biofuels would only reach 12.5 cents to 16.25 cents per gallon of fuel, which is well below the subsidies corn ethanol receives. Not surprisingly, corn ethanol accounted for approximately 95% of all biofuel production in the United States in 2007.[45] Thus, the equivalence values seem to have had no effect on reversing corn ethanol's dominance in the biofuels industry.

A Stronger Response: EPA's Regulation Implementing EISA

By the end of 2008, it had become clear to most scientists and policymakers that first-generation biofuels, and corn ethanol in particular, had several negative impacts that required regulatory attention. At the same time, EPA appeared unwilling to take meaningful steps to limit production of these first-generation biofuels. However, the passage of EISA in December 2007 created several new mandates for advanced biofuels production and specifically required new corn ethanol production to achieve a 20% reduction in greenhouse gas emissions as compared to emissions from fossil fuels.

First, EISA establishes new and aggressive production mandates for various advanced biofuels. EISA phases the requirements in slowly, by requiring, for example, in 2009 that 0.6 billion gallons of biofuels come from advanced fuels.[46] By 2016, advanced biofuels must supply 7.25 billion gallons of the mandate, and cellulosic biofuels must account for at least 4.25 billion.[47] By 2022, advanced biofuels must supply 21.0 billion gallons of all renewable fuels and will account for almost 60% of all renewable fuels required under the RFS.[48] When compared to RFS1 under the 2005 EPAct, the mandates under EISA represent a significant improvement in biofuels policy. While RFS1 had nominal production requirements for cellulosic and advanced biofuels,[49] RFS2 signals a new, and generally positive, direction for U.S. biofuels policy towards advanced and likely more sustainable renewable fuels.

Second, and perhaps more importantly, EISA defines various biofuels according to their lifecycle greenhouse gas emissions and only allows those biofuels that achieve

[45] F.C. Whittelsey, 'Bio-Hope, Bio-Hype', (2007) *Sierra Mag*., Sept-Oct, at 50–51 (available at http://www.sierraclub.org/sierra/200709/bio.asp).
[46] EPA RFS2 Proposal (n.9) 24,910 tbl.II.A.1-1.
[47] Ibid.
[48] Ibid. By 2022, the total RFS volume mandate will reach 36 billion gallons, and advanced biofuels must supply 21 billion gallons, or 58.3% of the total.
[49] EPA RFS1 Final Rule (n.19) 23,905 (noting that the 2005 EPAct required 250 million gallons of renewable fuels to come from cellulosic ethanol, starting in 2013).

net reductions in these emissions to qualify for the RFS mandates.[50] With an important exception for existing corn ethanol production, renewable fuels[51] must reduce lifecycle greenhouse gas emissions by 20%, compared to the baseline emissions of the fossil fuels they replace.[52] EISA creates three new categories of renewable fuels—'advanced biofuels', cellulosic biofuels, and biomass-based diesel—all of which must achieve even greater lifecycle greenhouse gas reductions compared to baseline emissions from fossil fuels.[53] 'Advanced biofuels' are any renewable fuels other than corn ethanol which must achieve a lifecycle greenhouse gas emission displacement of 50% compared to the fossil fuel it displaces.[54] Cellulosic biofuels are any renewable fuels derived from any cellulose, hemicelluloses, or lignin, and which must achieve 60% reduction in lifecycle greenhouse gas emissions compared to fossil fuels.[55] Finally, biomass-based diesel must achieve at least a 50% reduction in greenhouse gas emissions.[56] In sum, EISA requires a minimum reduction of 20% and up to a 60% reduction[57] in greenhouse gas emissions compared to fossil fuels. This change undoubtedly represents a significant step forward for U.S. biofuels policy.

Third, the definition of renewable fuels requires the fuels come from renewable biomass. The definition attempts to ensure that biofuels will not come directly from existing forests or other wildlands, and instead requires biofuels production to occur on already cultivated lands. Presumably, the definition will preclude U.S. fuel refiners, importers, and blenders from purchasing palm oil and sugarcane ethanol grown on recently converted forests or peatlands. As such, they should address, at least in part, some of the concerns raised regarding the direct emissions of greenhouse gases associated with biofuel production.[58]

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[50] EPA RFS2 Proposal (n.9), at 24,911.
[51] A renewable fuel is fuel produced from renewable biomass that is used to replace or reduce the quantity of fossil fuel present in transportation fuels. EPA RFS2 Proposal (n 9) 24,921.
[52] EPA RFS2 Proposal (n.9) at 24,924.
[53] EPA RFS2 Proposal (n.9) at 24,911.
[54] EPA RFS2 Proposal (n.9) at 24,923.
[55] Ibid.
[56] Ibid.
[57] EISA allows EPA to reduce these requirements by up to 10% per category of biofuel, if EPA determines the existing reductions are not commercially attainable. EPA RFS2 Proposal (n.9) at 24,924. EPA has proposed adjusting the emissions reductions downward to 44 or even 40% for advanced biofuels, based on its assessment of emissions reductions achievable through sugarcane ethanol production.
[58] For a discussion of how these restrictions could implicate World Trade Organization rules, *see* C. Payne, 'Local Meets Global: The Low Carbon Fuel Standard and the WTO', (2009) 34 *N.C. J. Int'l L. & Com. Reg*. 891, at 980-915 (citing *Food & Agric. Org. of the U.N., Unified Bio-Energy Terminology: UBET* (2004) 14, at 30–31, *available at* ftp://ftp.fao.org/docrep/fao/007/ j4504e/j4504e00.pdf).

EISA's Grandfathering Requirement for 'Old' Corn Ethanol

Although EISA defines renewable fuels to mean fuels that achieve a 20% reduction in lifecycle greenhouse gas emissions compared to fossil fuels,[59] this definition applies only to fuel produced from new facilities which commenced construction after December 19, 2007.[60] Fuel produced from facilities that commenced construction before then is exempt from the 20% reduction requirement.[61] In addition, EISA declares that facilities that commenced construction after the December 2007 cutoff date, but used natural gas or biomass to power the facility in 2008 or 2009, are 'deemed compliant' with the 20% reduction requirement.[62] These two exceptions, and particularly the grandfathering provision for 'old' ethanol facilities, have the potential to allow continued production of significant quantities of corn ethanol – perhaps up to 15 billion gallons per year[63] – despite EPA's conclusions that existing corn ethanol production emits more greenhouse gases than it prevents. The 'old' versus 'new' distinction therefore represents a significant flaw in RFS2 that could undermine the otherwise laudable goals of EISA.

EPA's proposed regulation included a preferred alternative and five alternative options to limit the harmful impacts of the grandfathering and 'deemed compliant' exceptions. In the final rule, EPA selected its preferred alternative, which will limit the exceptions to the baseline volumes of ethanol the facilities stated they were able to produce whenever they sought their initial air quality permits.[64] If a facility exceeded its baseline production levels, then any increased production would face the 20% greenhouse gas reductions requirement, but baseline production would remain exempt.[65] EPA's preferred alternative would still exempt approximately 15 billion gallons of corn ethanol production annually from the requirement that renewable

[59] EPA RFS2 Proposal (n.9) 24,924.
[60] Ibid.
[61] Ibid.
[62] EPA RFS2 Final Rule (n.27) 14,746.
[63] Ibid.
[64] EPA RFS2 Proposal (n.9) 24,926. Under the Clean Air Act, facilities must obtain permits before constructing any facility with the potential to emit more than 100 tons per year, or in some cases 250 tons per year, of regulated air pollutants. Facilities must record their potential emissions in their permit applications and typically calculate these emissions based on their predicted production capacity. EPA's proposed regulation would use these figures to establish baseline production limits for ethanol (EPA RFS2 Proposal (n.9), at 24,926). If, for some reason, the permit application did not state the plant's maximum capacity, the facility's actual peak production amount would establish its baseline amount (ibid).
[65] EPA RFS2 Proposal (n.9) at 24,926. EPA acknowledged that some production increases could occur within the plant's "inherent capacity" and suggested that some increases – perhaps a 10% increase above the established baseline capacity – would also remain exempt from the greenhouse gas reduction requirement (ibid).

fuels reduce greenhouse gas emissions by 20% compared to fossil fuel emissions levels.[66]

Will EPA's Approach also Grandfather New Corn Ethanol?

Another troubling issue arises with new corn ethanol facilities and their compliance with the 20% emissions reduction requirement. In its proposed rule, EPA calculated that new corn ethanol production would, over a 30-year timeframe, likely result in more greenhouse gas emissions than it would prevent, based on predicted production methods and indirect land use changes.[67] EPA's proposed rule would therefore have prohibited new corn ethanol production from qualifying as a renewable fuel under RFS2. In its final rule, EPA reversed course and determined that corn ethanol produced at new or expanded facilities using natural gas, biogas or biomass would meet the 20% greenhouse gas emissions reduction requirement.[68] EPA based its conclusion on new data and scientific methods for calculating indirect emissions associated with land use changes, and on assumptions about the types of technologies EPA would expect new facilities to employ.[69] As a matter of administrative law, EPA's changes represent a perfectly justifiable reversal based on updated science and economic data.[70] However, as a matter of good biofuels policy, EPA's determination appears premature and may enable corn ethanol producers to evade the greenhouse gas reductions requirements, even if scientific advancements reveal that indirect land use emissions are far greater than EPA predicted.

In developing both its proposed and final rules, EPA conducted an extensive survey of existing data to assess whether new corn ethanol and other biofuels would meet the greenhouse gas reduction requirements set by Congress. In both rulemaking proceedings, EPA identified areas of uncertainty and suggested that EPA would seek additional data and information to verify the accuracy of its assumptions.[71] As an agency charged with making certain decisions in an area abounding with scientific uncertainty, EPA's approach appears appropriate and cautious.

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[66] EPA RFS2 Final Rule (n.27) at 14,746.
[67] EPA RFS2 Proposal (n.9) at 25,042 (concluding that corn ethanol produced in a basic dry mill ethanol production facility would reduce emissions by 16% compared to fossil fuels over a 100-year period, but result in a 5% increase in emissions over a 30-year period); EPA RFS2 Proposal (n.9) at 25,042 tbl.VI.C.1-2 (showing that all types of corn ethanol production would fail to achieve the 20% reduction requirement over a 30-year timeframe).
[68] EPA RFS2 Final Rule (n.7) at 14,677.
[69] Ibid, at 14,677-79.
[70] *See Motor Vehicle Mfrs. Assn. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983) (noting that an agency may reverse itself where data support the agency's changed position).
[71] EPA RFS2 Final Rule (n.27), at 14,670.

However, EPA's determination that new corn ethanol production, which likely will not begin for years, will meet the 20% reduction requirement, appears premature and subject to change. Looking, for example, at the indirect land use emissions that will result from corn ethanol, EPA explained that it used improved satellite data to assess whether assumed cropland expansion would result in increased deforestation – and thus more greenhouse gas emissions – or other types of land conversion that would result in fewer emissions.[72] Once EPA decided that less deforestation would result, it lowered its overall greenhouse gas emissions estimates.[73] Similarly, EPA revised its assumptions about the types of facilities corn ethanol producers would build based on predictions about the economics of the industry in the future.[74] These assumptions predicted that future ethanol plans would need to operate more efficiently and produce valuable byproducts for them to compete in the future.[75] Collectively, these revised assumptions resulted in a conclusion, in which the agency was 'over 50% confident' that new corn ethanol plans would meet the 20% greenhouse gas reduction requirement.[76] In contrast, the agency was 95% confident that new corn ethanol would reduce emissions somewhere between 7 and 32% compared to the baseline.[77]

This range suggests that many of the emissions may fall on the high end, and not meet the 20% reduction requirement. If that proves to be the case, many facilities built in reliance on the rule may not ultimately comply with EISA. Those facilities will have three options: quit production; continue producing ethanol, but no longer receive production credits under EISA; or seek an exemption from Congress. Based on the history of the biofuels industry, the third approach seems the most likely one for corn ethanol producers to pursue. If that happens, corn ethanol will continue its reign for far longer than even EPA's new rule suggests may happen.

Slow Movement Towards a Sustainable Biofuels Policy

As the science has developed to link corn ethanol and other first-generation biofuels to increased emissions of greenhouse gases, increased conversion of rainforests

[72] EPA RFS2 Final Rule Preamble (n.27), at 14,679.
[73] Ibid.
[74] EPA RFS2 Final Rule Preamble (n.27), at 14,785-86.
[75] Ibid.
[76] EPA RFS2 Final Rule Preamble (n.27), at 14,786.
[77] Ibid.

and peatlands into agriculture lands, and increased localized pollution, U.S. biofuels policy has also slowly begun to change. However, while various advocates have called for the United States to develop a sustainable biofuels policy, neither Congress nor EPA has heeded the call. U.S. biofuels policy, even after the passage of EISA in 2007, will continue to allow production of corn ethanol, and by definition, will therefore continue to allow biofuels policy to result in various unintended consequences.

Yet, U.S. biofuels policy has moved significantly away from its original foundation and, if it continues to progress, could actually serve as a model for other biofuels laws in other countries. Congress' decision to define renewable fuels and various categories of advanced and cellulosic fuels according to their greenhouse gas reductions represents a huge step forward in biofuels policy. Most other countries are only now beginning to pass biofuels laws, and none of these establish clear greenhouse gas reductions goals like U.S. biofuels law does. The new definitions in EISA, moreover, have the potential to mitigate the other unintended consequences of biofuels development. For example, EISA defines 'advanced biofuels' as a fuel not derived from corn starch. As the volume mandates for advanced biofuels increase in the future, these mandates will be less likely to affect food supplies. The movement away from food crops as a source of fuel could prove to be an especially important development as global populations increase and global fuel supplies shrink due to climate change and other pressures. EISA's small steps therefore suggest a movement, however slight, towards sustainability.