Growth Energy Supplemental Comments on EPA's Renewable Fuel Standard (RFS) Program: RFS Annual Rules

Docket # EPA-HQ-OAR-2021-0324

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INTRODUCTION

Growth Energy is the world's largest association of biofuel producers, representing 89 biorefineries that annually produce nearly 9 billion gallons of low-carbon renewable fuel and 99 businesses associated with the biofuel production process. Growth Energy respectfully submits these supplemental comments to rebut specific points that other comments have made concerning the Environmental Protection Agency's Proposed *Renewable Fuel Standard (RFS) Program: RFS Annual Rules*.[1]

DISCUSSION

I. OVERWHELMING EVIDENCE IN THE RECORD DEMONSTRATES THERE IS NO CAUSAL CONNECTION BETWEEN THE RFS AND ADVERSE ENVIRONMENTAL IMPACTS

Multiple commenters state as fact that the RFS causes adverse impacts to species and species' habitats as well as broader adverse environmental impacts.[2] They allege without support that the annual RVOs have "significant, if not overwhelming," influence on farmers' decisions to plant crops as feedstock for renewable fuels.[3] On this basis, those commenters argue that EPA must make a "may effect" finding under Section 7 of the Endangered Species Act ("ESA") and reduce renewable fuel volumes below those in the NPRM. This is legally and factually wrong.

There is extensive evidence in the record addressing the wide body of scientific literature that demonstrates that there is *no* established causal connection between the RFS and adverse impacts to the environment.[4] Those commenters ignore the complex chain and multiple variables relevant to whether the RFS or any individual year's RVOs cause farmers to make planting decisions that have environmental or species impacts. They misconstrue the ESA analysis in concluding that because, at a general level, corn and soy production may affect various aquatic species, EPA must make a "may effect" determination.[5] One does not follow from the other. EPA must evaluate whether *this rulemaking*—not general agricultural practices in the United States—may adversely impact listed species. As set forth in detail in Growth Energy's initial comment and two attachments thereto—Ramboll's November 2019 Supplemental Memo and Net Gain's Expert Report—there is no evidence of any causal

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[1] *Renewable Fuel Standard (RFS) Program: RFS Annual Rules*, Proposed Rule ("NPRM"), 86 Fed. Reg. 72,436 (Dec. 21, 2021).

[2] *See, e.g.*, Comment of Center for Biological Diversity comment ("CBD Comment") (Feb. 4, 2022), EPA-HQ-OAR-2021-0324-0527; Comment of National Wildlife Federation ("NWF Comment") (Feb. 4, 2022), EPA-HQ-OAR-2021-0324-0464.

[3] CBD Comment at 3.

[4] *See* Comment of Growth Energy ("Growth Energy Comment"), Ex. 3 (Feb. 4, 2022), EPA-HQ-OAR-2021-0324-0521.

[5] CBD Comment at 3.

relationship between corn grown for the RFS and impacts to endangered or threatened species or habitat.[6] We encourage EPA to review these materials in evaluating commenters' claims.

II. A RECENTLY PUBLISHED LIFECYCLE ANALYSIS STUDY IS FLAWED AND CONTRADICTS THE BEST AVAILABLE SCIENCE

A commenter refers to work by Tyler Lark, et. al., which was later published on February 14, 2022, as *Environmental Outcomes of the US Renewable Fuel Standard* ("2022 Lark Report").[7] The 2022 Lark Report asserts that the greenhouse gas ("GHG") impacts of corn ethanol are 21% *higher* than gasoline based on models that rely on the purported environmental effects of increased corn prices. The results of this paper lie far outside the credible range of carbon intensity values as determined by numerous studies by governmental bodies and academics, which are summarized by Scully, et. al, in *Carbon intensity of corn ethanol in the United States: state of the science*.[8] Growth Energy has already submitted a far more credible analysis of the carbon intensity of corn ethanol.[9]

The analysis and conclusions presented in the Lark Report are not new. The same authors previously presented them at an American Association for the Advancement of Science meeting in February 2019. That work was already rebutted in the August 2019 Ramboll report submitted by Growth Energy with its initial comment.[10] A more recent report by Net Gain identifies flaws and shortcomings in the 2022 Lark Report.[11] Among Net Gain's findings are that the 2022 Lark Report:

- fails to evaluate the relationship between oil prices and corn prices;
- fails to explain and evaluate the uncertainties related to its "business as usual" counterfactual, which attempts to simulate a scenario in which the RFS never existed;
- fails to explain how "recommended practices" related to land-use conversion modeling were applied to address substantial flaws in one of the author's prior published works;
- relies on non-public data sets, limiting the ability of independent reviewers to verify the validity of the paper's results and conclusions;

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[6] Growth Energy Comment, Ex. 3.

[7] NWF Comment at 3.

[8] Environ. Res. Lett. 16 (2021) 043001, https://doi.org/10.1088/1748-9326/abde08.

[9] *See* Growth Energy Comment, Ex. 1.

[10] Growth Energy Comment, Ex. 3-1, §3.4.

[11] *See* Net Gain, *Preliminary Comments on the Publication by Lark et al. 2022 Titled* Environmental Outcomes of the US Renewable Fuel Standard ("Net Gain Report") (Mar. 4, 2022) (attached as Ex. 1).

- includes grossly misleading language characterizing modeled results as fact without adequate acknowledgement of uncertainties and assumptions within the models.

A more detailed discussion of the flaws in the 2022 Lark Report is forthcoming.

III. EPA'S PROPOSED REQUIREMENTS FOR 2022 ARE NOT "TOO HIGH"

American Petroleum Institute ("API") contends that "the 2022 proposed volumes are too high and will not be achievable in the market without the use of carryover RINs."[12] API explains that the "combined effective volume standard for 2022"—reflecting both the annual volume requirement and the supplemental 250-million-gallon obligation to cure the unlawful 2016 general waiver—exceeds EPA's projected 2022 RIN generation by 563 million RINs.[13] API's argument is misguided in several respects.

First, API's argument rests on a plainly incorrect description of EPA's analysis. The 563-million RIN shortfall API sees disregards EPA's projection of 558 million RINs from imported renewable diesel.[14] Those RINs would fully eliminate the putative gap, and API offers no reason to doubt EPA's projection of imported renewable diesel.[15]

Second, as Growth Energy has already explained, EPA's proposal substantially *understates* the achievable volume of renewable-fuel use in 2022.[16] In fact, with the right RFS signals, the market could meet—or exceed—not only the proposed 2022 volumes but also the proposed supplemental obligation for 2022 without relying on carryover RINs.[17] And it is not only appropriate but also obligatory that EPA set RFS volume requirements at higher levels to incentivize increased use of renewable fuel. "Congress intended the Renewable Fuel Program to be a 'market forcing policy' that would create 'demand pressure' to increase consumption of renewable fuel."[18] API's position instead assumes that EPA's duty under the Clean Air Act is to set volume requirements that match what EPA predicts the market will do independently of the RFS. That is clearly incorrect—if that were the case, the RFS program would be pointless. But EPA lacks authority to adopt an interpretation of the statute that "turns the Renewable Fuel

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[12] Comment of American Petroleum Institute ("API Comment") 2 (Feb. 4, 2022), EPA-HQ-OAR-2021-0324-0454.

[13] *Id.*

[14] *Compare* API Comment at 2 *with* EPA, *Draft Regulatory Impact Analysis: RFS Annual Rules* ("DRIA") 51 (Dec. 2021), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013KOG.pdf.

[15] *See* DRIA at 176, 179.

[16] Growth Energy Comment at 65-74.

[17] *See id.* at 67-69.

[18] *American for Clean Energy v. EPA ("ACE")*, 864 F.3d 691, 705 (D.C. Cir. 2017).

Program's 'market forcing' provisions on their head,"[19] renders a statutory provision "surplusage,"[20] or nullifies a statutory program.[21]

Third, it is appropriate for the 250-million-gallon supplemental obligation to be met entirely with carryover RINs. The unlawful 2016 general waiver inflated the RIN bank. Between 2016 and 2017, the RIN bank increased by 835 million.[22] That massive excess was the direct result of the unlawful waiver; but for the waiver, the bank would have increased by 500 million fewer RINs. And the bank has never fallen below 500 million RINs since then. In other words, all the RINs that were carried over because of the unlawful waiver are still available. (As EPA acknowledges, although carryover RINs are available for compliance for only one year, excess RINs can in effect be carried over perpetually as obligated parties use expiring RINs for compliance and "replace[]" them with "newer vintage RINs."[23]) Therefore, even if obligated parties need to rely on carryover RINs to meet the supplemental curative obligation, that is proper because that simply entails using the carryover RINs that were *created by the unlawful waiver*.

Finally, it is also appropriate for carryover RINs to be used to meet the 2022 RVOs. As Growth Energy has explained, EPA *should* set RFS standards high enough to reduce the number of carryover RINs in order to promote the investment and growth in renewable-fuel use that Congress intended when it created the RFS program.[24]

IV. EPA MUST REQUIRE OBLIGATED PARTIES TO FULLY MAKE UP THE 500 MILLION GALLONS COVERED BY THE UNLAWFUL 2016 GENERAL WAIVER

API opposes the proposed 250-million-gallon supplemental obligation for 2022 (and another for 2023) to remedy the unlawful 500-million-gallon general waiver of the 2016 total volume requirement. API argues that "the D.C. Circuit directed that EPA balance the burden on obligated parties with the goals of the RFS program" and it is "not possible to go back in time and induce additional demand for a prior year."[25] Alternatively, API argues that EPA should first "maximize the use of its cellulosic waiver authority," which would increase the cellulosic waiver by 380 million gallons and thereby leave only 120 million gallons out of the original 500-million-gallon waiver to be remedied through a supplemental obligation.[26] API's objections are

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[19] *Id.* at 712.

[20] *City of Chicago, Illinois v. Fulton*, 141 S. Ct. 585, 591 (2021) (applying "canon against surplusage").

[21] Growth Energy Comment at 50-51.

[22] EPA, Carryover RIN Bank Calculations for 2019 Final Rule at 7 (Nov. 7, 2018).

[23] NPRM at 72,454 n.91.

[24] Growth Energy Comment at 60-62.

[25] API Comment at 3.

[26] *Id.*

wrong. EPA can and must issue additional obligations equal to 500 million gallons to remedy the unlawful 2016 general waiver.[27]

A. The assertion that the D.C. Circuit directed EPA to balance burdens and goals on remand is false. The court has called for such a balancing only when EPA is belatedly setting an RFS standard after failing to do so by the statutory deadline.[28] Here, in contrast, the court *invalidated* EPA's original standard and now EPA must correct that error. Indeed, the court has made clear that the "normal" rules governing "retroactive" rulemaking do not apply when an agency is "correct[ing] its own legal mistakes," especially when the agency is "rectify[ing] legal mistakes identified by a federal court."[29] Precluding EPA from remedying its error out of concern for the remedy's "retroactive" effect "merely because [EPA] bungled [the standard] the first time around … would make a mockery of the error-correcting function of appellate review."[30] This is particularly true in the context of RFS volume obligations: because they apply to only one calendar year and are not set until shortly before that year begins (assuming they are set on time), it is impossible for judicial review to conclude and for EPA to take remedial action on remand before the period covered by the obligation is already past. Consequently, under API's preferred approach, EPA could "effectively nullif[y]" any judicial decision that an RFS standard is "invalid"—something EPA clearly lacks authority to do.[31]

Moreover, on remand EPA may not "reinstat[e] the preexisting … rule[]"[32]—which is what API expressly advocates.[33] Rather, EPA must now "reach a different bottom-line decision" from its 2016 rule.[34] In particular, EPA's duty on remand is to take "corrective … action strictly implementing" the statute as interpreted by the D.C. Circuit.[35]

B. In any event, as Growth Energy has explained, the proposed supplemental obligation does not raise the kinds of burdens that are to be accounted for in retroactive rulemaking.[36] For one thing, the supplemental obligation would apply prospectively, i.e., solely to future conduct, and would also provide obligated parties ample notice and opportunity to comply. On top of that, obligated parties have no settled, protected interest in their compliance with the original 2016 total RVO because that standard was always under serious legal cloud:

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[27] *See* Growth Energy Comment at 79-80.

[28] *See ACE*, 864 F.3d at 712, 718; *Monroe Energy, LLC v. EPA*, 750 F.3d 909, 920 (D.C. Cir. 2014); *National Petrochemical & Refiners Ass'n v. EPA*, 630 F.3d 145, 166 (D.C. Cir. 2010).

[29] *Verizon Tel. Companies v. FCC*, 269 F.3d 1098, 1111 (D.C. Cir. 2001).

[30] *Id.*

[31] *In re Core Commc'ns, Inc.*, 531 F.3d 849, 856 (D.C. Cir. 2008); *accord In re People's Mojahedin Org. of Iran*, 680 F.3d 832, 837-838 (D.C. Cir. 2012).

[32] *WildEarth Guardians v. EPA*, 830 F.3d 529, 535 (D.C. Cir. 2016).

[33] *See* API Comment at 3.

[34] *Multicultural Media, Telecom & Internet Council v. FCC*, 873 F.3d 932, 936 (D.C. Cir. 2017).

[35] *WildEarth*, 830 F.3d at 535.

[36] Growth Energy Comment at 80.

Growth Energy (and others) argued it was unlawful in their comments on the proposal in 2015[37] and then challenged its legality in court just days after it took effect.[38] Indeed, the D.C. Circuit has repeatedly held that it is "unreasonable" for regulated parties to "rely" on an agency's statutory interpretation once they have been "put on notice" that the interpretation is "in dispute," whether through administrative or judicial challenges.[39]

C. It does not matter that the supplemental obligation could not increase the use of renewable fuel *in 2016*. The inflated RIN bank resulting from the unlawful 2016 general waiver suppresses the effect of future RFS standards.[40] By clearing out those bonus carryover RINs from the bank, the supplemental obligation would help ensure that the 2022 standards stimulate the nominal level of renewable-fuel use.[41] Put another way, EPA must set standards high enough to consume the unlawfully available carryover RINs in order to fulfil its "statutory mandate to 'ensure[]' that [the RFS] requirements are met."[42]

D. API's alternative proposal also fails because EPA has no authority now to increase the cellulosic waiver.

EPA has no factual basis to increase the cellulosic waiver. When EPA initially set the 2016 standards, it determined that there was no basis for a greater cellulosic waiver; those standards already reflected the "greate[st] [reduction] tha[t] can be achieved using the cellulosic waiver authority."[43] And none of the relevant facts have changed.

Nor can EPA use the cellulosic waiver authority to reduce the total standard by a greater amount than it reduced the advanced standard. The cellulosic waiver can be used to remedy only a shortfall in cellulosic biofuel production, and again, the original cellulosic waiver already did that fully. The Clean Air Act labels the waiver authority "Cellulosic biofuel."[44] The statute states that the waiver authority is triggered by a shortfall in cellulosic biofuel production: when "the projected volume of cellulosic biofuel production is less than the minimum applicable volume" specified in the statutory table.[45] And the statute states that the shortfall in cellulosic

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[37] Growth Energy Comment on EPA's *Proposed Renewable Fuel Standard Program: Standards for 2014, 2015, and 2016 and Biomass-Based Diesel Volume for 2017*, at 17-28 (July 27, 2015), EPA-HQ-OAR-2015-0111-2604.

[38] Pet. for Review of Americans for Clean Energy et al., *ACE*, ECF No. 1593082 (D.C. Cir. Jan. 8, 2016); *see also ACE*, 864 F.3d at 707.

[39] *Verizon*, 269 F.3d at 1111 (citing *Pub. Serv. Co. of Colorado v. FERC*, 91 F.3d 1478, 1488-1491 (D.C. Cir. 1996)).

[40] *See supra* p.4; Growth Energy Comment at 86-87.

[41] *See* Growth Energy Comment at 63-64; *ACE*, 864 F.3d at 697.

[42] *ACE*, 864 F.3d at 698-699 (quoting 42 U.S.C. §7545(*o*)(3)(B)(i)).

[43] *See* 80 Fed. Reg. 77,420, 77,434, 77,439, 77,443 (Dec. 14, 2015).

[44] 42 U.S.C. §7545(*o*)(7)(D).

[45] *Id.* §7545(*o*)(7)(D)(i).

biofuel production defines the extent to which EPA may reduce the advanced and total standards: after reducing the cellulosic standard to the level of cellulosic production, "the Administrator may also reduce the applicable volume of [total] renewable fuel and advanced biofuels requirement[s] established under paragraph (2)(B) by the same or a lesser volume."[46] As the D.C. Circuit has recognized, the authority to reduce the advanced and total standards upon a cellulosic production shortfall merely "reflects the nested nature of the renewable fuel categories: Because cellulosic biofuel is a subcategory of advanced biofuel, a reduction to the cellulosic biofuel volume requirement leaves a gap in the supply of advanced biofuel available to satisfy the advanced biofuel volume requirement," and in turn the nesting of the advanced standard within the total standard means that a reduction for a cellulosic shortfall could also leave a gap in the supply of total renewable fuel.[47]

Thus, once EPA determines the appropriate level of advanced biofuel and exercises its cellulosic waiver authority to reduce the advanced standard to that level—as EPA did in originally setting the 2016 advanced standard—EPA *fully* remedies the shortfall in cellulosic biofuel that triggered its cellulosic waiver authority and exhausts the extent to which it can use that authority to reduce the total standard. Any further reduction of the total standard at that point would not remedy the cellulosic shortfall and therefore could not be accomplished under the cellulosic waiver authority.

EPA has no authority to convert a power that is narrowly drawn for a specific purpose into a general authority to discretionarily pursue whatever policy preferences it might have.[48] That is particularly so given that Congress expressly provided EPA with other authorities for reducing the total volume requirement: a general waiver if there is "inadequate domestic supply" of renewable fuel or if the "implementation of the requirement would severely harm the economy or environment of a State, a region, or the United States."[49] Congress thus carefully constructed a system in which EPA could reduce volume requirements, but "only" in the "limited circumstances" it expressly identified in those statutory provisions.[50] The statute cannot, therefore, be interpreted to authorize EPA to waive the total volume requirement where the statutory preconditions are not met.[51] (And, to be clear, there is no basis for EPA to exercise

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[46] *Id.*

[47] *ACE*, 864 F.3d at 731.

[48] *Whitman v. American Trucking Ass'n*, 531 U.S. 457, 468 (2001) ("Congress … does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions—it does not, one might say, hide elephants in mouseholes."); *ACE*, 864 F.3d at 713; *Utility Air Regulatory Grp. v. EPA*, 573 U.S. 302, 325 (2014) ("An agency has no power to 'tailor' legislation to bureaucratic policy goals by rewriting unambiguous statutory terms."); *Friends of Earth, Inc. v. EPA*, 446 F.3d 140, 145 (D.C. Cir. 2006).

[49] 42 U.S.C. §7545(*o*)(7)(A).

[50] *National Petrochemical & Refiners Ass'n*, 630 F.3d at 149.

[51] *ACE*, 864 F.3d at 712 (rejecting statutory interpretation that would have "allow[ed] waiver under the inadequate-supply provision based on lesser degrees of economic harm" than needed to satisfy "the severe-harm waiver standard" (quotation marks omitted)).

its general-waiver power to reduce the 2016 total volume requirement; it is undisputed that there was adequate domestic supply of renewable fuel,[52] and there is no reason to think that meeting an additional 250-million-gallon requirement in 2022 would severely harm the economy of a state, a region, or the country.)

V. EPA CANNOT AND SHOULD NOT INCREASE THE LIMIT ON USING CARRYOVER RINS

API asks "EPA to temporarily increase the 20% cap on satisfying obligations … to 40% for 2021 compliance, and 30% for 2022 compliance."[53] The reason, API explains, is that some refiners and importers already have "sufficient RINs for each of the biofuel standards" applicable in 2020, and thus the proposed reduction to the 2020 standards will cause them to hold large amounts of excess 2020 RIN, which they would like to be able to use for compliance with the 2021 and 2022 standards.[54] EPA cannot and should not take this step, which may be good for the obligated parties that are flush with RINs but is bad for the RFS program.

First, EPA cannot change the cap without commencing a new rulemaking to amend 40 C.F.R. §80.1427(c)(3). EPA could not implement the change API seeks through this rulemaking because EPA has not provided notice that such a change is under contemplation.[55]

Second, raising the cap under these circumstances would undermine the RFS program while benefiting only some obligated parties, namely, those holding large amounts of excess 2020 RINs. That some obligated parties were able to comply with the 2020 standards as originally set, notwithstanding the supposed disruptions that EPA points to in the NPRM,[56] confirms—as Growth Energy previously explained—that compliance was achievable all along and that reducing the 2020 standards now would only reward obligated parties that neglected their legal obligations and consequently signal to obligated parties that they no longer need to try to comply with their RFS obligations.[57] That would fundamentally and impermissibly undermine the RFS program. Moreover, API's proposal disregards the congressionally prescribed credit program: obligated parties with excess RINs can readily sell them in the RIN market, capturing revenue for themselves and enabling other obligated parties to meet their RFS obligations.[58]

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[52] *See* 80 Fed. Reg. at 77,438.

[53] API Comment at 4.

[54] *Id.*

[55] *See* 42 U.S.C. §7607(d)(3); *Kisor v. Wilkie*, 139 S. Ct. 2400, 2420 (2019).

[56] *See* NPRM at 72,438.

[57] Growth Energy Comment at 48-51.

[58] *See* 42 U.S.C. §7545(*o*)(5).

Growth Energy Supplemental Comments on EPA's Proposed Renewable Fuel Standard Program: Renewable Fuel Standard Annual Rules

Docket # EPA-HQ-OAR-2021-0324

Exhibit 1

Net Gain
ECOLOGICAL SERVICES

PRELIMINARY COMMENTS ON THE PUBLICATION BY LARK ET AL. 2022 TITLED *ENVIRONMENTAL OUTCOMES OF THE US RENEWABLE FUEL STANDARD*

Prepared For: Growth Energy
Date: March 4, 2022
Author: Pieter Booth, Principal
Net Gain Ecological Services

This memorandum provides Net Gain's preliminary observations regarding *Environmental Outcomes of the US Renewable Fuel Standard* published by Lark et al. (2022).[1] The work described in this paper appears to be the same as that presented at an American Association for the Advancement of Science meeting on February 15, 2019. The August 2019 Ramboll report previously submitted to the docket for this rulemaking as part of Growth Energy's comment letter (ID: EPA-HQ-OAR-2021-0324-0521) discusses the presentation material at Section 3.4. We briefly summarize below a few key issues with the study's attribution of adverse environmental impacts to the Renewable Fuel Standard (RFS) based on a preliminary, limited review. These include:

- The study importantly neglects to evaluate the relationship between oil prices and corn prices.
- The study fails to adequately explain and evaluate uncertainties associated with its use of a "Business as usual" scenario absent the RFS as a counterfactual.
- With respect to land use change modeling, the study purports to correct for grave deficiencies in one of the author's prior work by applying "recommended practices," but does not explain how those practices were applied. Further, it is not possible to evaluate some of the data sets themselves as they are non-public, thus limiting third party reviewers' abilities to evaluate the validity of the conclusions the authors draw.
- The authors characterize as fact numerous modeled results, giving the reader a misleading impression of false confidence in the conclusions which are drawn from highly uncertain models embedded with extensive assumptions that may or may not reflect the real-world.

The Effect of the RFS on Corn Prices

The paper by Lark et al. (2022) is an ambitious effort to establish quantitative causal linkages between enactment of the RFS as a policy to a variety of environmental outcomes using a series of interlinked models. The approach, and the results presented rest on the assumption that the price of corn is heavily influenced by increased demand for ethanol due to the RFS. The discussion of the econometric model in the supplemental material to the publication states that the modeling controlled for important factors other than the RFS that likely affected the price of corn, but it makes no mention of the price of oil. Figures 1 and 2 below show nominal prices of West Texas Intermediate crude and

[1] Lark, T., N. Hendricks, A. Smith, and H. Gibbs. 2022. Environmental outcomes of the U.S. Renewable Fuel Standard. Proceedings of the National Academy of Sciences, February 14, 2022. https://doi.org/10.1073/pnas.2101084119. This paper is referenced as "forthcoming" in National Wildlife Federation's comment to Docket#: EPA-HQ-OAR-2021-0324 submitted February 4, 2022 at p.3 (ID: EPA-HQ-OAR-2021-0324-0464).

corn for the latest 20-year period (the shaded areas on the graphs show periods of US recessions) and demonstrates that corn prices track very closely to the price of oil.

Figure 1. West Texas Intermediate Crude Price ($/barrel).

Figure 2. U.S. Corn Price ($/bushel).

Given the importance of oil in the agricultural sector, neglecting to consider this relationship appears to be an important omission.

Use of a Counterfactual to Estimate Impacts

The authors attempted to construct the counterfactual case; that is, simulate what the world would have looked like without the RFS (called the "Business as Usual" scenario). It is well understood that the greater the difference between the simulated counterfactual case and available empirical data, the more the counterfactual depends upon model assumptions and inferences. The authors state that "For all estimates, we compare outcomes under the 2007 RFS to a business-as-usual (BAU) counterfactual scenario in which ethanol production satisfies only the volume required by the initial 2005 version of the policy…". The effects of the RFS reported by the authors are therefore based on their comparison between an interpretation of actual conditions (e.g., land use change) and a manufactured counterfactual situation which may or may not reflect a realistic alternative state. In our opinion, the authors do not adequately explain the underlying uncertainty such approaches engender.

Measurement of Land Use Change

In addition to the price of corn, the authors rely on estimates of land use change (both changes in crop rotation as well as changes from other uses such as grassland to agriculture for biofuels feedstock). Regarding the ability to "measure" land use change, the paper implicitly recognizes many problems with spatial data interpretation and state that land use change was mapped at the field level using the updated recommended practices. Although data sources are identified, the specific data sets used are not disclosed. The "recommend practices" alluded to are those developed by the lead author to correct for demonstrated deficiencies in some of his previous work on land use change and there is no description of how the"recommended practices" were applied.

The authors rely on at least some data sets that are not publicly available, therefore limiting the ability of a third party to replicate their work. For example, the authors state that their analysis relies on a database built using field boundary data from USDA Common Land Unit (CLU) among other data sources. The CLU database is confidential and not available to the general public.[2]

Additional Comments

The paper starts out by making it clear that the research being presented is the result of extensive data selection, manipulation and analysis; development and application of numerous models; and development and application of links between models. The paper is therefore presenting modeled, or estimated results based on a complex and interrelated set of mathematical models, each with underlying sets of assumptions and uncertainties. Although the authors purport to have propagated the uncertainties inherent in each modeling step, it cannot be ascertained from the material presented whether the overall uncertainty is appropriately reported.

In the Results and Discussion sections, the tone of the presentation changes in a misleading and irresponsible manner such that results are presented as fact, providing a casual reader with the impression that the effect may have been measured and not modeled. Examples of such statements include the following:

- "the RFS stimulated 20.8 billion L (5.5 Bgal) of additional annual ethanol production";
- "the increase in corn prices relative to other crops increased the area planted to corn on existing cropland by an average of 2.8 Mha per year";
- "the RFS decreased abandonment by 0.4 Mha [0.1, 0.6]…"', and so forth for nitrogen and phosphorous pollution, erosion, and GHG emissions.

All of these are modeled results, the validity of which rely on complex underlying assumptions with associated uncertainties, and these weaknesses are not adequately acknowledged by the authors. It is also misleading and irresponsible of the authors to suggest that there is a link between the RFS and potential impacts to threatened and endangered species when they present no information to support these claims. See, for example, the following statement: "Erosion losses from crop fields can also degrade soil quality over time (50, 51), contribute to enhanced GHG emissions in waterways (52), and impair water quality and aquatic habitat (53, 54) including that of threatened and endangered species (55, 56)". These are merely very general and well-known potential adverse effects of agriculture and and are presented with no context whatever in relation to the RFS).

In our opinion, the potential policy and environmental implications of the research presented in this paper demand that the research be subjected to the highest level of review covering all aspects of the modeling effort with the goal of developing a scientific consensus regarding the environmental tradeoffs inherent in the production of biofuels.

[2] The USDA Web site states the following regarding CLU data: "CLU is not in the public domain. Section 1619 of the Food, Conservation, and Energy Act of 2008 (Farm Bill), only allows the sharing of this data to individuals or organizations (governmental or non-governmental) certified by FSA as working in cooperation with the Secretary of Agriculture. Users of the data must be providing assistance to USDA programs, and must require access to CLU data to complete that work."

For further discussion of these issues, see August 2019 Ramboll Report at Section 3.4, which is included in Growth Energy's comment letter (ID: EPA-HQ-OAR-2021-0324-0521) at Exhibit 3.[3]

[3] See Exhibit 2 to Net Gain, *Analysis of EPA's Proposed Rulemaking for 2020, 2021, and 2022 RVOs, Regarding Land Use Change, Wetlands, Ecosystems, Wildlife Habitat, Water Resource Availability, and Water Quality* (Feb. 3, 2022).