VIA ELECTRONIC FILING
March 6, 2023

Dr. Wayne Cascio
Director, Center for Public Health and Environmental Assessment
Office of Research and Development
1301 Constitution Avenue NW,
Washington, DC 20004

Docket ID No. EPA–HQ–ORD–2020–0682

Re: Notice of Public Comment Period for the Biofuels and the Environment: Third Triennial Report to Congress External Review Draft

Dear Dr. Cascio:

Clean Fuels Alliance America (Clean Fuels) appreciates the opportunity to provide comments in response to EPA's External Review Draft (ERD) for Biofuels and the Environment: Third Triennial Report to Congress (RtC3). Clean Fuels is the U.S. trade association representing the entire biodiesel, renewable diesel, and sustainable aviation fuel supply chain, including producers, feedstock suppliers and fuel distributors. Made from an increasingly diverse mix of resources such as recycled cooking oil, soybean oil, and animal fats, the clean fuels industry is a proven, integral part of America's clean energy future. We serve as the clean fuel industry's primary organization for technical, environmental, and quality assurance programs and are the strongest voice for its advocacy, communications, and market development.

The biodiesel and renewable diesel industry is on a path to sustainably double the market to 6 billion gallons annually by 2030, eliminating at least 35 million metric tons of CO_2 equivalent emissions annually. With advancements in feedstocks, use will reach 15 billion gallons by 2050 or sooner. These fuels are among the cleanest and lowest-carbon fuels available today to help reduce greenhouse gas emissions now and are available to meet President Biden's near- and long-term climate goals, particularly in hard to decarbonize sectors.[1]

As an initial matter, Clean Fuels agrees with EPA's assessment of the scope of the ERD RtC3 with one caveat. Clean Fuels agrees that the charge Congress gave EPA in Clean Air Act Section 204 is to assess the environmental impacts of the RFS itself and not the impacts of the biofuels industry holistically. We

[1] Executive Office of the President. Executive Order 14008: Tackling the Climate Crisis at Home and Abroad, 86 FR 7619 (February 1, 2021), available at https://www.federalregister.gov/d/2021-02177

also agree with the time period, 2005-2020, that EPA limits its assessment to be based on the plain text of the law and concur with the "likely future effects" timeframe out to 2025. We would, however, urge EPA to reconsider its scope relative to petroleum fuels.

Congress smartly included a mandate in Section 204 to provide the information necessary to determine whether the Renewable Fuel Standard needs amendment should any significant adverse environmental impacts stem from the program. Anthropogenic environmental impacts are inevitable, however, without important context around the RFS' environmental impacts, Congress cannot know whether they are reasonable or whether the program merits revision. Furthermore, the purpose of the RFS program is to *reduce* greenhouse gas emissions. This reduction is inherently relative to a base case scenario in which the country continues to rely wholly on fossil fuels. As such, to be informative for Congress, the RtC3 should include the important context of the program's environmental impacts relative to fossil fuels. While EPA attempts to provide some context around biodiesel's environmental impacts relative to petroleum in Part 3 of the ERD, it relies on insufficient information for purposes of the RtC3 leaving the audience with the impression that biofuels have worse environmental impacts than petroleum, which, given the magnitude of these industries and the glaringly omitted environmental benefits biofuels provide, is demonstrably misleading.

There is no dearth of scientific literature regarding the environmental impacts of fossil fuels that could provide EPA with the necessary insight to provide this additional context to the report. Congress would certainly benefit from this additional information to make informed decisions about the program. Consequently, Clean Fuels recommends EPA include additional information about the impacts of fossil fuel production and consumption to provide the important context of what the RFS' environmental impacts mean for the sustainability of U.S. transportation.

Furthermore, while Clean Fuels agrees with the ERD's focus on the impacts of the RFS, we urge EPA to re-examine its assessments of the biofuels and agricultural markets and the methodology it uses to assess land cover and land management change. These assessments are the very foundation of the entire report. Please refer to our comments on Chapters 4 and 5 for our detailed analysis and suggestions for improvement on these foundational topics.

We appreciate EPA's concerns about the potential indirect and international effects of the RFS program; however, the current scientific literature and data tend to raise more questions than provide answers. We urge EPA to acknowledge this by expanding its discussion on the limitations of the many studies to date. The gaps in the literature should serve as opportunities for improved and more robust future research. Indeed, Clean Fuels works with several academic institutions and national labs to further our understanding in this area. We would be happy to provide data and expertise to EPA to improve the science on this important topic.

The remainder of our comments are organized below by ERD chapter; however, we note that comments on Part 1 and Part 2 chapters of the ERD may impact analysis and findings in the subsequent chapters found in Part 3. We have highlighted areas of cross-referencing where relevant to our comments but note that additional sections of the ERD may also require revision based on these underlying comments. Thank you in advance for your consideration of our comments. We would be pleased to provide any additional information or answer any questions EPA may have as it considers finalization of the RtC3.

Sincerely,

Veronica Bradley
Director, Environmental Science
Clean Fuels Alliance America

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Chapter 4: Biofuels and Agricultural Markets

EPA should revise language about soybean markets to reflect additional market mediating effects that may impact its assessment of soy biodiesel's environmental impacts.

Clean Fuels agrees with EPA that the soybean and soybean oil markets mediate effects of the RFS, but EPA oversimplifies this relationship in its introductory text where it states that "when the demand for soy biodiesel increases, the vegetable oil market *will* substitute away from soybean oil to other oils."[2] Vegetable oil substitution may occur should the supply of soybean oil remain the same when overall demand for vegetable oil increases; however, the U.S. oilseed processing (crushing) industry has responded to demand signals for biodiesel, renewable diesel, and sustainable aviation fuel by investing in capacity to increase supply of soybean oil. Increasing supply thus mitigates the higher prices of soybean oil that induce substitution to other oils. Based on industry announcements, 21 new processing plants or expansions to existing plants are planned to come online by 2026. These facilities would add approximately 650 million bushels of additional crush capacity, equaling nearly one billion gallons of additional soybean oil supplies. Furthermore, despite this increased U.S. crush capacity of soybeans, soybean exports remain strong today and will continue to grow through 2030 based on current biofuels policy, according to USDA.[3]

Along with expanding crush capacity, additional supplies of soybean oil will become available due to a continuation of improved soybean yields and increased oil yields from oilseed processers, as well as an overall expansion of domestic oilseed processing capacity. While EPA contends that soybean oil yields have not changed since the 2010/11 marketing year,[4] Clean Fuels disagrees. Reviewing the most recent USDA Oil Crops Yearbook for soybean oil and soybeans shows that average yields in the 2021/22 marketing year were 11.86 pounds per bushel; 3.5 percent *above* 2010/11 levels.[5] That being said, EPA should not rely on two data points on soybean oil yields to determine soybean oil trends over time. There is considerable annual variation in soybean oil yields due to both environmental and market conditions. Agronomic factors such as growing conditions and the variety of soybean grown in any given year will impact how much oil is contained in the soybean itself. In addition, soybean processors will also

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[2] ERD at p. 4-17, l. 434 (emphasis added).

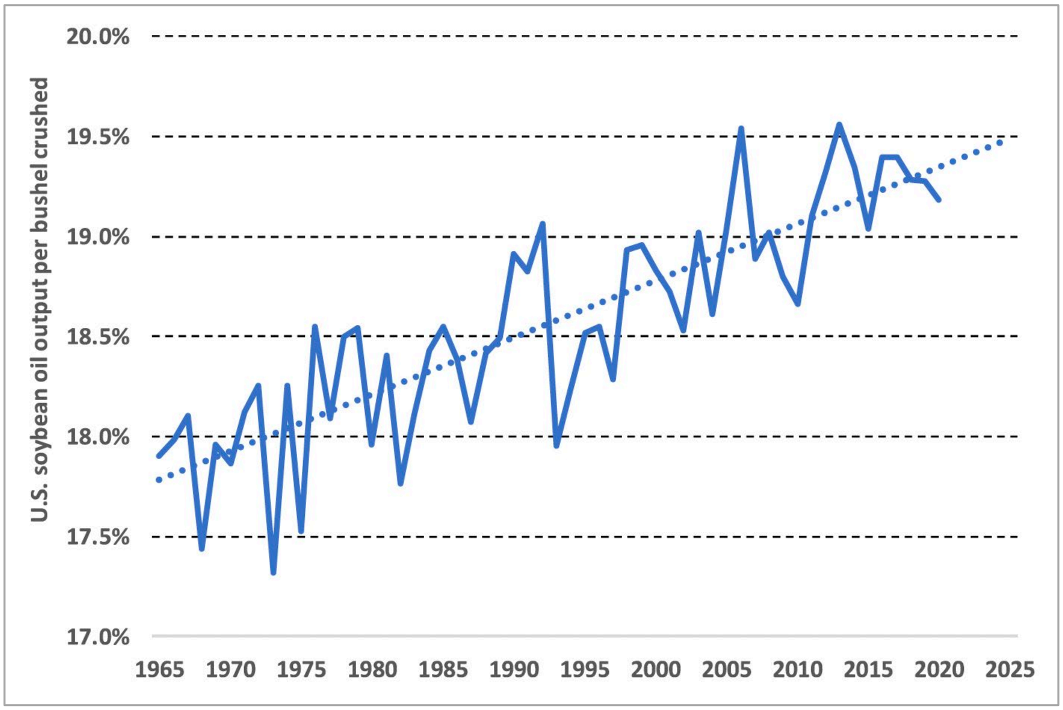
[3] USDA, Office of the Chief Economist, USDA Agricultural Projections to 2031, Figure 13 at p. 24 (Feb. 2022), *available online at* https://www.usda.gov/sites/default/files/documents/USDA-Agricultural-Projections-to-2031.pdf.

[4] ERD at p. 4-18, l.458.

[5] *See* USDA Economic Research Service, "Oil crops yearbook," https://www.ers.usda.gov/data-products/oil-crops-yearbook/.

vary oil extraction targets depending on the market value of soybean oil. Said another way, soybean processors are more likely to process the soybean further to extract additional oil from it should the value of soybean oil be relatively high to the value of soybean meal on a per bushel basis.
Taking these factors into consideration, EPA should inspect soybean oil yield data more thoroughly to discern any true trends. Indeed, with further inspection of USDA's National Agricultural Statistics Services (NASS) crushing statistics, there is a clear signal showing a long-run upward trend in soybean oil yields. In an assessment on lipid feedstock availability and supply LMC International conducted for Clean Fuels, LMC International found an increase in soybean oil yields over time by fitting a linear trend to annual observations from 1965 to 2020 (see **Figure 1**). There is no evidence to suggest that this trend will not continue.

Figure 1. U.S. soybean oil production as a percentage of soybean crush *(LMC International 2022)*[6]



In addition to increased soybean oil supply which will likely mediate substitution of soybean oil to other vegetable oils, winter annual oilseed crops will also supply an increasing share of oil to biofuel producers to use as feedstocks over the next five years. These advancements in feedstock supply will reduce pressure on soybean oil to meet demand as a biomass-based diesel (BBD) feedstock. Oilseed crops like camelina, CoverCress™, carinata brassica, and winter canola will relieve pressure on soybean oil to meet biomass-based diesel feedstock demand. For example, considering EPA's recent approval of canola oil pathways to renewable diesel, jet fuel, naphtha, liquefied petroleum gas, and heating oil under the RFS,[7] Canadian canola oil is expected to expand into the U.S. feedstock market. Indeed, according to LMC

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[6] LMC International 2022. The Outlook for Increased Availability & Supply of Sustainable Lipid Feedstocks in the U.S. to 2025. Report for Clean Fuels Alliance America, *available at* Appendix A in Clean Fuels' comments to EPA on the Renewable Fuel Standard Program: Standards for 2023-2025 and Other Changes, https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0427-0805.
[7] 87 Fed. Reg. 73956 (Dec. 2, 2022).

International, 5.8 billion pounds of Canadian canola oil is expected to be available *per year* for U.S. biofuel use by 2025, translating to more than 700 million gallons of biodiesel per year.[8]
Lastly, EPA should understand and reflect in the final RtC3 that only a portion of edible soybean oil is consumed directly by the consumer. Most soybean oil is used by food manufacturers and food service. These end users' decisions on which vegetable oils to use are based on more than just price including factors like the physical, chemical and taste properties of the oils and their availability. It takes months or years to reformulate processed foods containing vegetable oils and obtain approval for labelling of that reformulation, so vegetable oil substitution is a strategic decision. As a result, vegetable oil substitution from soybean oil to other vegetable oils occurs primarily due to food manufacturing and food service needs and policy. Consequently, increased demand for soybean oil as a BBD feedstock is not a sufficient condition for substitution away from soybean oil.

Anticipated increased supplies of soybean and other oilseed oils, as noted, as well as imperfect substitution, as evidenced above, are important factors for EPA to consider in its discussion of the soybean and soybean oil markets in Chapter 4 as well as other sections of the RtC3 like Chapter 16 on International Effects, which also considers substitution of vegetable oils. As such, Clean Fuels recommends EPA revise the text particularly at pp. 4-17–18 to reflect these considerations and to correct the record that soybean oil yields are in fact increasing over time.[9]

Chapter 5: Domestic Land Cover and Land Management

EPA should improve its methodology for reviewing trends in land cover and land management change over the RtC3 time series to better assess potential LCLM change.

EPA has taken a somewhat confusing and rudimentary approach to analyzing multiple datasets on land cover and land management (LCLM), concluding that cropland acres have increased over the RtC3 time series. While Clean Fuels does not dispute this conclusion, we highlight here what EPA did *not* conclude from its analysis: that the *RFS program* caused that increase in cropland. This is an important distinction the RtC3 should be clear in articulating in its conclusions in Section 5.4.1 because without making this distinction, the audience may misinterpret EPA's analysis as an assessment of cropland increase due to the RFS, given the scope of the report.

Moreover, Clean Fuels also recommends that EPA improve its methodology for the trends assessment conducted in this chapter. While we do not suggest EPA's conclusion would change because of the following recommended improvements, we do believe EPA's methodology is lacking scientific rigor and suggest these improvements to ensure future LCLM change analyses are sufficiently robust to avoid leading EPA and other stakeholders to draw inappropriate conclusions from the data.

Recommendation #1: Establish a consistent beginning anchor year for measuring trends and magnitude of change for LCLM across datasets.

The ERD states that the focal time period for its evaluation is from 2005 to present;[10] however, in many instances, the beginning anchor year used to analyze the Census of Agriculture (Census), Major Land Use Database (MLU), and National Resources Inventory (NRI) data start after the study period and are

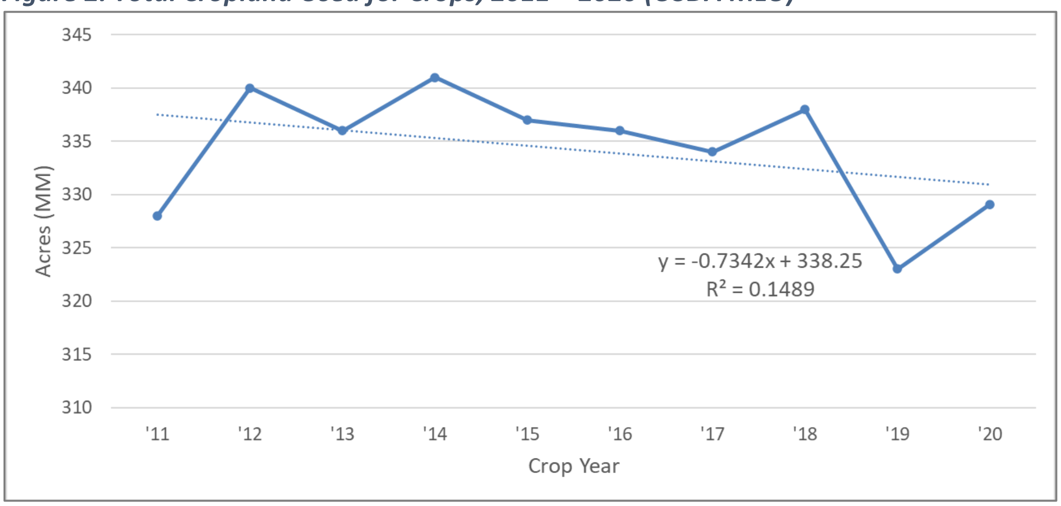
[8] LMC International 2022.
[9] For example, EPA should revise the statement at p. 4-17, l. 434 to state "When demand for soy biodiesel increases, the vegetable oil market ~~will~~ **may** substitute away from soybean oil to other oils."
[10] ERD at p. 5-4, l. 92.

inconsistent across the datasets and throughout the chapter.[11] Using a starting anchor year after 2005 prevents a proper analysis of how cropland acres may have been affected by the RFS because the anchor year data would include potential RFS impacts. Therefore, Clean Fuels recommends EPA use the year 2002 as the starting anchor year for assessing trend and magnitude of change in cropland area because it is prior to 2005 (the first year of focus of study) and data for 2002 exist in all the major datasets reviewed. This starting anchor year should be used consistently for all analyses in Chapter 5 and would be consistent with the starting anchor year used in Sections 5.3.1.2.1 and 5.3.1.2.2.

Recommendation #2: Run statistical analyses of time series before drawing conclusions about trends in the data.

Market forces, governmental policies, and environmental factors, like weather patterns, all influence farmer decisions and success of cropland use, resulting in potentially substantial annual variability in true cropland acres. As such, statistical analysis of the data is necessary to properly inform the trends and conclusions that can be drawn from them. For example, while EPA states that cropland acres have increased since 2011 according to the MLU, running a statistical analysis on the data from 2011 to present as shown in Figure 2 below does not show any statistically significant trend over that time period.

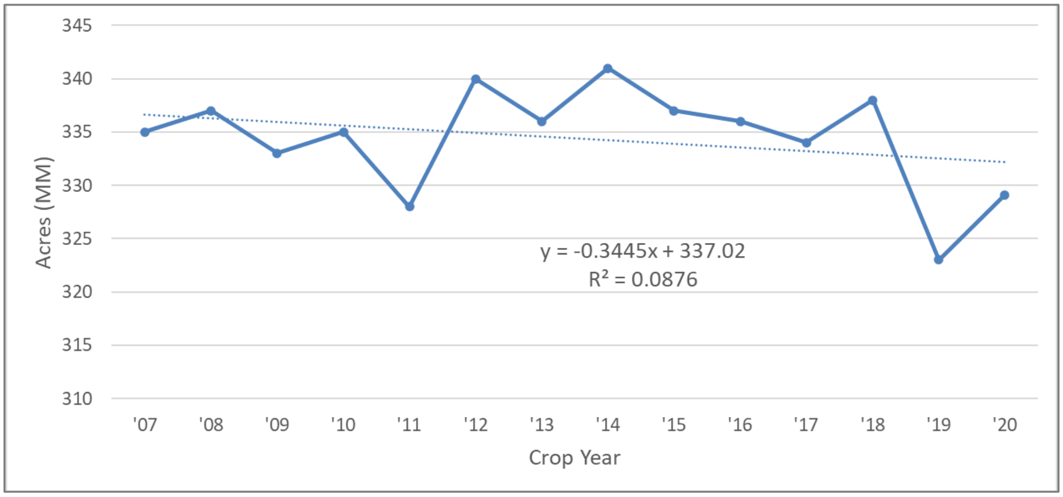
Figure 2. Total Cropland Used for Crops, 2011 – 2020 (USDA MLU)



Similarly, while EPA states that "cultivated acreage (including corn/soybean and other cultivated cropland) has begun to increase since 2007—reversing a long-term decline…," a statistical analysis of the data do not indicate any such trend as shown below in Figure 3.

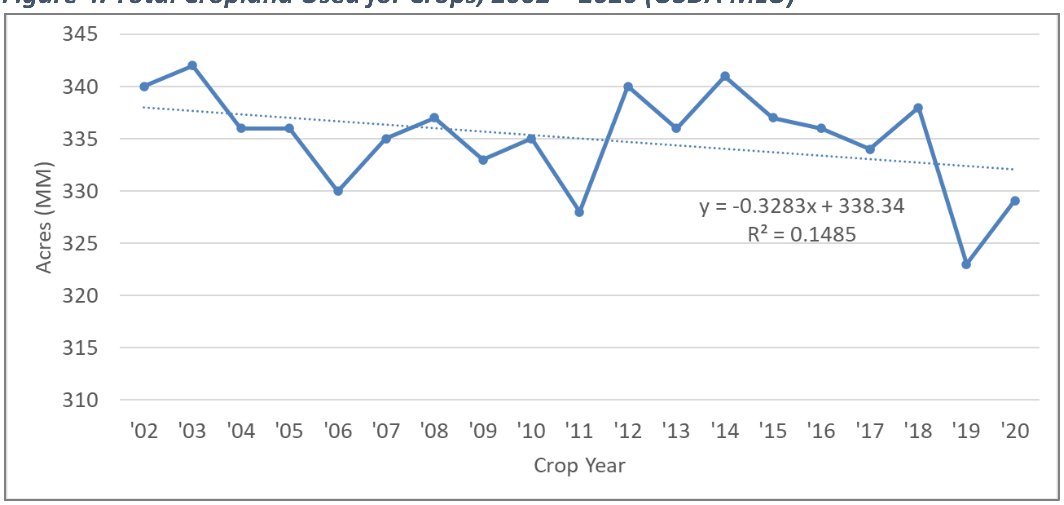
[11] *See e.g.,* Sections 5.3.1.1, using 2007 and 5.3.1.3, using 2008 as starting point for trends evaluation.

Figure 3. Total Cropland Used for Crops, 2007 – 2020 (USDA MLU)



When evaluated from 2002, as recommended above, data from the MLU show no statistically significant trend of cropland change from 2002 to 2020, despite over 10 million acres less of total cropland in 2020 than in 2002 (see Figure 4 below). The lack of a statistically significant trend reflects the variability of cropland used for crops on an annual basis, as noted above. This underscores the caution that should be exercised when drawing conclusions of trends based on limited data points from a population with substantial variability.

Figure 4. Total Cropland Used for Crops, 2002 – 2020 (USDA MLU)



Recommendation #3: Reconcile, then address, then acknowledge disparities and methodological issues among datasets.

EPA acknowledges, and Clean Fuels concurs, that differences in categories and definitions occur across the studied datasets, which can contribute to confusion about LCLM change trends. But this lack of LCLM nomenclature harmonization should not prevent EPA from harmonizing the nomenclature itself to reconcile the datasets and assess trends in a more robust way.

The nomenclature for the datasets used throughout Chapter 5, the Census, NRI, NASS, and MLU, can and should be harmonized to aid in reconciling the data they contain. Table 1 below suggests how EPA can resolve this harmonization exercise for the Census, NRI and MLU.[12]

Table 1. Suggested mapping of USDA nomenclature for purposes of the RtC3 Report

<table>
<tr><th>Census of Ag</th><th>NRI</th><th>MLU</th></tr>
<tr><td>Harvested cropland</td><td rowspan="3">Cultivated cropland (includes summer fallow and failed)</td><td>Harvested</td></tr>
<tr><td>Failed</td><td>Failure</td></tr>
<tr><td>Summer Fallow</td><td>Cultivated summer fallow</td></tr>
<tr><td></td><td>Non-cultivated cropland</td><td></td></tr>
<tr><td>Total Cropland (RtC3)[1]</td><td>Total Cropland</td><td>Total cropland used for crops</td></tr>
<tr><td colspan="3">[1] As relevant for the purposes of the RtC3 Report (to exclude idle cropland and cropland used for pasture as discussed below).</td></tr>
</table>

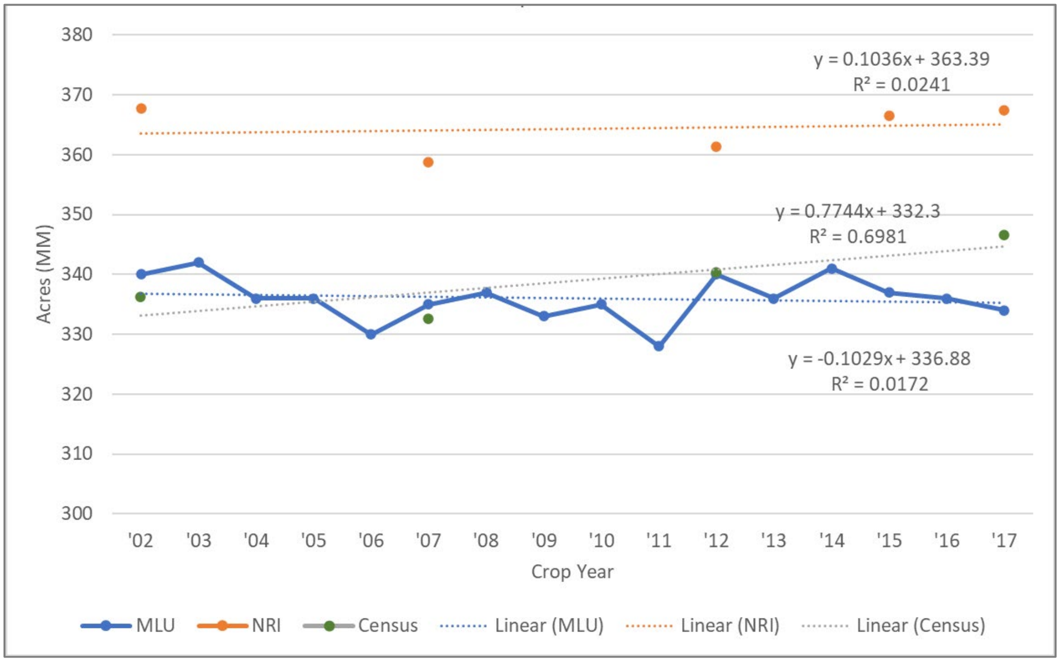
Furthermore, EPA raises doubts about the cropland estimates derived from the USDA Census and MLU data due to methodological issues, yet these issues do not necessarily create greater uncertainty in the overall estimates of agricultural land. At pp. 5-8–9, ll. 201–209, EPA notes a methodological change in the Census' questionnaire that seemingly leads to changes in estimates for cropland for pasture and pastureland acreage but inappropriately concludes that this change renders the total agricultural land estimates inaccurate. While this methodological change could create uncertainty around the acres of cropland for pasture or pastureland as subcategories, total cropland, which includes the aggregate of these and other agricultural land categories, is not necessarily less certain. Stated differently, while the parts may have greater uncertainty bounds, the sum of the parts may not. Similarly, EPA's reference to the US Forest Service's Forestry Inventory and Analysis methodology change does not impact cropland area estimates and therefore does not invalidate the MLU estimates for total cropland used for crops. As shown in Table 1 above, to reconcile the datasets, EPA can exclude from analysis of the Census data the "cropland for pasture" category, which would be consistent with the NRI estimates of cropland because pastureland is not included in NRI's cropland category. In addition, EPA should exclude "cropland-idle"[13] from the Census cropland data, retaining harvested, failed, and summer fallow categories, which would be analogous to NRI's cultivated and non-cultivated cropland.

Once EPA conducts this reconciliation, a review of these datasets shows the alignment between the Census and MLU data as shown in Figure 5 below.

[12] The NASS dataset does not apply to this harmonization of datasets when evaluating total cropland used for crops as it does not provide total cropland statistics.

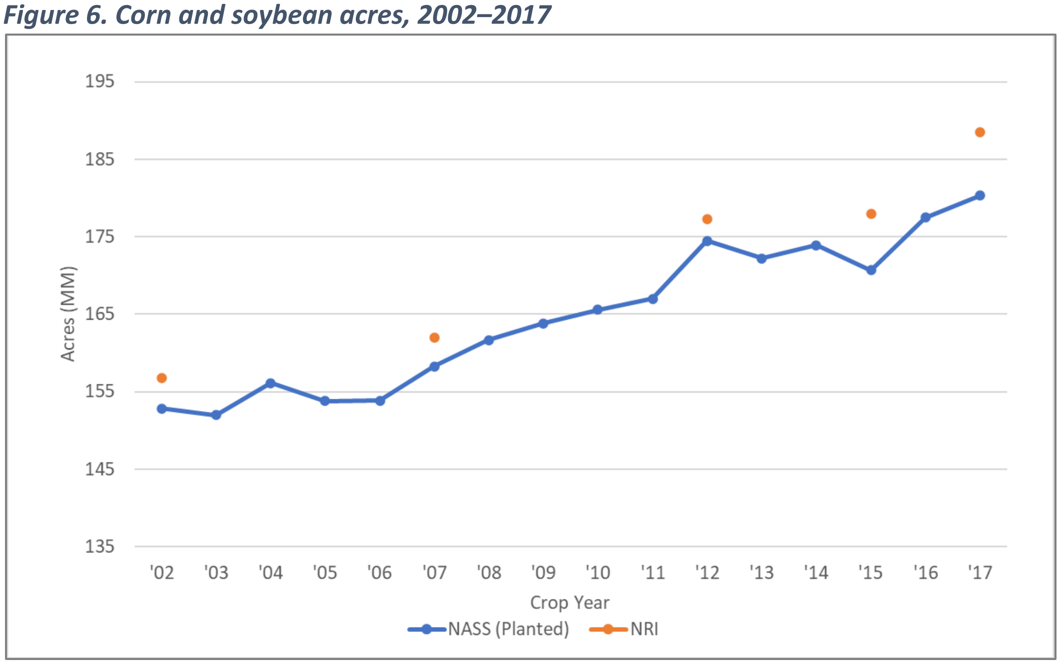
[13] The Census' "cropland-idle" category includes land in cover and soil-improvement crops and cropland in which no crops were planted. Cropland enrolled in CRP is included in this category (USDA-NASS, 2017). The NRI has a separate class for CRP land which is separate from Cropland (Cultivated and non-cultivated). The Census' "cropland-idle" contains non-CRP idle cropland as well, which would not be included in the suggested aggregation of the data. Therefore, the suggested aggregation of data for the Census data most likely is underreporting total cropland; however, the MLU also excludes idle cropland (including CRP acreage), so the suggested aggregation of cropland classes for the Census is consistent with the MLU's "Total cropland used for crops."

Figure 5. Cropland area estimates by data source, 2002–2020



Comparing these results to the NRI estimates shows the NRI estimates consistently exceed the MLU and NASS estimates for corn and soybean over time as shown in Figure 6 below.[14] The NRI 2002, 2015 and 2017 surveys' estimates of these acres range from 4 to 8 million acres more than NASS estimates of combined corn and soybean acres (Figure 6). Therefore, the magnitude of change could be underestimated by the MLU, NASS, or Census data or, more likely, overestimated based on the NRI surveys.

Figure 6. Corn and soybean acres, 2002–2017



[14] And the total cropland estimates for the Census as shown in Figure 5.

Reconciling these datasets, where possible, provides a clearer picture of how they relate to each other, aiding in the assessment of trends, or lack thereof. There is greater disparity between the NRI and MLU datasets with the estimation of other cultivated and non-cultivated cropland than there is with the NASS and MLU corn/soybean acre estimates. For example, the differences of the absolute levels of acres between the NRI dataset, and the MLU and Census datasets are large (see Figure 5 above). The NRI dataset estimates between 21.3 to 33.4 million acres (6.3 to 10%) more than the MLU between 2002 and 2017. The ERD refers to the corn and soybean acreage estimates from both the NRI and NASS, the consistent higher estimation of corn and soybean acres by the NRI, and the strength of the annual NASS data survey. Consequently, EPA should interpret the magnitude of NRI estimates of changes in corn and soybean acres with caution.

Based on these recommended revisions to EPA's methodology, Clean Fuels suggests EPA re-assess its statements in Chapter 5 to better reflect the conclusions that can validly be drawn from the data. It is apparent from the inconsistencies in the datasets, each of which have pros and cons for use in a trends analysis, that EPA should not treat NRI data preferentially for its LCLM change analysis.[15] Each dataset has methodological independence to derive data and different sources of error. EPA should revise its statements regarding trends to acknowledge that MLU data do not show an increase in "total cropland used for crops." In addition, EPA should aim to reconcile, address, and acknowledge these differences to derive a more comprehensive assessment of LCLM change in the United States before it attempts to derive any causality from the RFS to that change.

EPA inappropriately relies upon the Lark et al. (2020) study to affirm its LCLM conclusions and as the basis for subsequent analysis.

As previously noted, EPA's analysis of the trends in cropland acres over time is flawed. EPA then uses Lark et al. (2020) (Lark study) to affirm the conclusions it draws from its flawed analysis, but the Lark study is itself a flawed study. EPA should therefore revise its conclusions about LCLM that rely on this study and should revise its analyses in subsequent chapters that rely on the Lark study's acreage change estimates.[16]

The Lark study has several flaws that merit its exclusion from serious reliance in the RtC3, most notably its use of an inappropriate time series and dataset in its methodology for assessing LCLM change. First, the Lark study uses the wrong anchor year from which to assess LCLM change. The RFS went into effect in 2005, which the ERD appropriately uses as the beginning of the RtC3's study period, yet the Lark study uses 2008 as its start year. Using as a starting point from which to measure change a year after the implementation of the RFS necessarily means the study cannot accurately measure change from before the RFS went into effect. Selecting a year well before RFS implementation, like 2002 as noted above, provides a more reasonable base year from which to measure change not only to avoid any direct impacts of the effects of the RFS but to also avoid effects of market signals that pending RFS implementation could have generated.

In addition, the Lark study relies upon a dataset that should not be used as the basis for assessing LCLM change generally, nor should it be used for comparison with other datasets analyzed in Chapter 5. LCLM change for the RFS purposes considers changes in land cover from non-cropland land cover categories to

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[15] *See* ERD p. 5-39, ll. 841-842.

[16] *See* Chapter 9 (Soil Quality); Chapter 10 (Water Quality); Chapter 11 (Water Use and Availability); Chapter 12 (Terrestrial Ecosystem Health and Biodiversity); Chapter 13 (Aquatic Ecosystem Health and Biodiversity); and Chapter 14 (Wetland Ecosystem Health and Biodiversity).

the cropland category. As such, it is important to have reasonably high accuracy within the dataset across both agricultural and non-agricultural land cover categories.

The Lark study uses the USDA National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL) data to assess LCLM change, but NASS states that the strength and emphasis of CDL is on *crop-specific* land cover categories, not all land cover categories or even all agricultural land cover categories.[17] The purpose of the CDL is to provide acreage estimates for major commodity crops and to produce crop-specific, categorized geo-referenced output products. The CDL program does not focus on non-agricultural land cover or land use. As a result, NASS depends on the U.S. Geological Survey's National Land Cover Database (NLCD) for data on non-agricultural land cover categories.

Moreover, the CDL's classification accuracy for grassland and pasture categories is low despite being included as an agricultural land cover category. NASS categorizes grassland/pasture as agriculture in its legend,[18] leading CDL users to potentially believe these land cover categories have high accuracy; however, rather than rely on its own CDL data for these categories, NASS relies on the NLCD for classifying the geospatial data as grassland/pasture.[19] The CDL classification process has difficulty characterizing grassland-type land cover, reflected in its low accuracy (<50%).[20] The low accuracies of grass-type land cover have been further confounded by NASS's attempts to improve the accuracy of grassland. NASS has inconsistently blended ground-truthed information from the USDA Farm Service Agency, NLCD and NASS across different years and from different states, resulting in inconsistent LCLM classifications stemming from irregularities in the quality and representativeness of those grass-type covers (e.g., alfalfa, non-alfalfa hay, grassland herbaceous) gleaned from the ground data per geographical region and year.[21] Consequently, CDL users may unknowingly believe that analyzing LCLM change from grassland and pasture to cropland with CDL data provides accurate results, but it in fact does not.

Change detection between agricultural and non-agricultural land using datasets requires accurate and consistent classification of both agricultural and non-agricultural land types. The low classification accuracy for non-agricultural land cover categories in general and for grassland and pasture categories in particular, however, indicate the CDL is a poor dataset for analyzing LCLM change in the United States. NASS even recommends users consider the NLCD for studies involving non-agricultural as well as grassland/pastureland cover categories.[22] Moreover, as noted above, NASS has inconsistently blended CDL data sources, methodology, and training and validation data over time, producing inconsistent CDL datasets and introducing additional variables to any LCLM change analysis relying on it. Any assessment of LCLM change could therefore reflect the differences in the CDL datasets rather than any real change in LCLM.

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[17] USDA-NASS-CDL, CropScape and Cropland Data Layers – FAQs, https://www.nass.usda.gov/Research_and_Science/Cropland/sarsfaqs2.php#Section1_1.0 (last accessed Mar. 4, 2023).
[18] *See e.g.*, https://www.nass.usda.gov/Research_and_Science/Cropland/docs/US_2019_CDL_legend.jpg.
[19] USDA-NASS-CDL (Mar. 4, 2023); Johnson, D., Mueller, R., and Willis, P. (2015). The Utility of the Cropland Data Layer for Monitoring U.S. Grassland Extent. *Conference Proceedings for the Third Biennial Conference on the Conservation of America's Grasslands*.
[20] Johnson et al., 2015.
[21] Johnson et al., 2015.
[22] USDA-NASS-CDL (Mar. 4, 2023).

In addition to the Lark study being inappropriate as the basis for EPA analysis generally, it is also inappropriate for use to compare with other datasets EPA includes in Chapter 5. For example, the CDL includes other hay in its non-cropland category despite this class being included as cropland subcategories in the NRI and Census data. The NRI includes other hayland in its "cultivated cropland" category. Similarly, the Census includes hay in its "Harvested" class and summer fallow in "Total Cropland."[23] As a result, the categorization and therefore resulting dataset used in the Lark study is inconsistent with the other datasets, creating a different baseline from which its analysis is done. In addition, fallow land, classified as cropland in the CDL, Census, NRI and MLU, is considered class dependent in the Lark study. In other words, an image's classification was dependent on its classification in the previous year. The CDL did not have nationwide coverage until 2008, and as a result, the Lark study resorted to other data sources for geographic areas in which there were coverage for 2007 images. Despite this effort, not all areas in which fallow land was identified in 2008 by the CDL was sufficiently verified as being either fallow (cropland) or noncropland, resulting in areas that may have been falsely categorized as noncropland.

The ERD does not adequately acknowledge these differences in land classification nomenclature nor the methodologies and sources of error among the datasets used for the analysis in Chapter 5. At a minimum, EPA needs to supplement the explanations of uncertainties and limitations beginning at p. 5-38, l. 827 to inform the audience of the severe limitations to its ability to compare these datasets and to correct the record that "adjustments and definitional reconciliations" were not sufficiently made to justify the ERD's conclusions about LCLM change.[24] Furthermore, EPA should not reference the Lark study at all to compare with the NRI or Census datasets to corroborate any of EPA's conclusions about LCLM change.

EPA does note that respected researchers in this field disagree with the dataset the Lark study's methodology uses to estimate LCLM change, but that appropriate adjustments may allow the CDL to provide meaningful information.[25] Abundant research indicates, however, that attempts to address these issues with using the CDL for LCLM change have resulted in inconsistent applications of techniques that have produced different results.[26] There is no evidence that the use of these techniques has generated more accurate analyses than simply using different datasets that may be more consistent in accuracy across land classes and over time.

While EPA does not need to resolve this expert debate, it should respect it by avoiding reliance on a single study (the Lark study) with a disputed methodology to validate LCLM change or to analyze environmental impacts in Part 3 of the ERD. Given the uncertainty of the Lark study's results, the study

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[23] USDA-NASS. (2017). Census of Agriculture, Appendix B. General Explanation and Census of Agriculture Report Form.
https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usappxb.pdf.

[24] Clean Fuels would also recommend EPA correct the statement in l. 831 to reflect that the datasets do not provide "projections" but historical estimates.

[25] *See* ERD at p.5-25, l. 570.

[26] *See e.g.,* Johnson et al. 2015; Dunn et al. 2017, Measured extent of agriculture expansion depends on analysis technique. *Biofuels, Bioproducts and Biorefining*, 11(2), 247-257. Jingxiong, Z. and Yunwei, T. 2012, Misclassification error propagation in land cover change categorization. *Geo-spatial Information Science*, 15(3), 171-175; Lark et al. 2017, Measuring land-use and land-cover change using the U.S. Department of Agriculture's cropland data layer; cautions and recommendations. *Int. J. Earth Obs. Geoinf*. 62, 227-235; Reitsma et al. 2016, Does the U.S. Cropland Data Layer Provide an Accurate Benchmark for Land-Use Change Estimates? *Agronomy Journal*. 108(1), 266-272.

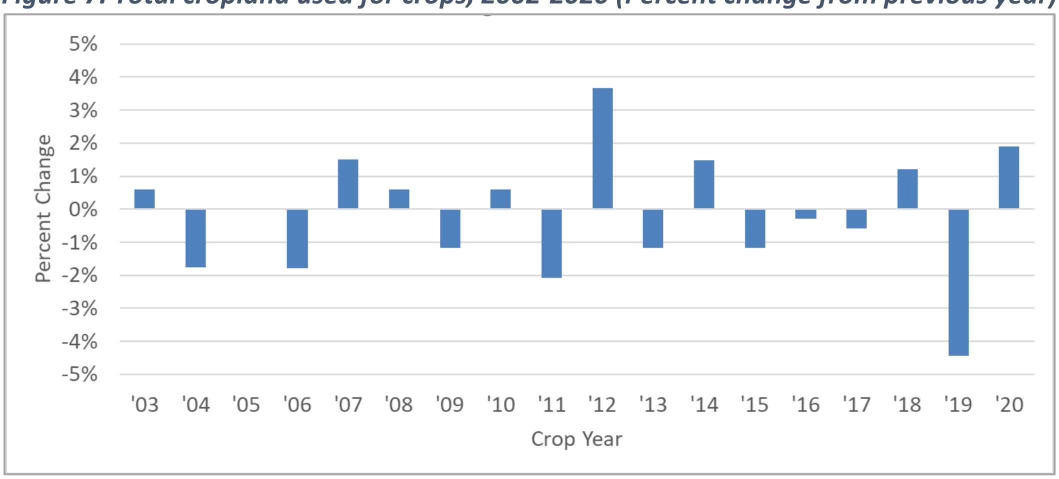
should only be relied upon insofar as demonstrating relationships (e.g., the impact of LCLM change on soil quality) and to show only that cropland conversion has occurred over the time series and the general geographic areas of that change in the United States. It should not be used as the foundation, as EPA has done in Chapters 5 and 9 through 14, to attribute environmental impacts from LCLM change to biofuel production in general or to the RFS in particular.

Comments on Chapter 5 Recommendations

Clean Fuels concurs with EPA's first two recommendations included in this Chapter and would further recommend, as articulated in our methodology recommendation #3 that standardized and consistent land cover and land management classification nomenclature be agreed upon by the research community and governmental agencies on a going-forward basis. In the interim, the nomenclature of the various LCLM datasets referenced in the ERD should be harmonized and mapped against each other to enable an improved assessment of LCLM change across the different datasets. Clean Fuels would also recommend temporal sampling be increased to more accurately capture the variability and to increase the accuracy of LCLM assessments. Agriculture is dynamic in nature and there appears to be a growing demand to assess its environmental outcomes.

As noted above in our methodological improvements section, Clean Fuels disagrees with EPA's recommendation that LCLM trends be preferentially based on the NRI. The NRI's estimates tend to exceed the Census and MLU datasets, and its differences must be reconciled. In addition, the infrequency of the NRI survey can produce misleading conclusions if the start or end anchor years happen to reflect a year in which acres vary significantly from trend or from other datasets. Rather, multiple datasets should be used to assess historical trends in LCLM to account for the variability in annual agricultural land acreage as shown in the Figure 7 below. Furthermore, the latest technologies should be used to capture LCLM from this point forward.

Figure 7. Total cropland used for crops, 2002-2020 (Percent change from previous year) (USDA MLU)



Chapter 7: Attribution: Biodiesel and Renewable Diesel

EPA's discussion of the RFS' impacts on palm biodiesel imports and implied switch to palm oil usage may be misleading without further analysis of outside legal restrictions and other market forces.

In Section 7.3.4, EPA suggests that the RFS program may incentivize the importation of palm-based diesel should D6 RIN prices be relatively high; however, EPA's own data suggest no D6 RINS have been generated from imported BBD since 2017,[27] despite RIN prices experiencing record highs since then without net D6 RIN generation increasing. Instead, the countervailing duties EPA notes in reference to Argentinian soy biodiesel imports[28] also apply to Indonesian palm biodiesel, despite EPA's glaring omission.[29] So long as these countervailing duties stay in place, the RFS cannot induce the importation of palm biodiesel from Indonesia where the two sole grandfathered palm biodiesel facilities exist. While this trade case is currently under review for extension of the countervailing duties, the court is widely expected to rule in favor of continuing these countervailing duties, preventing palm biodiesel importation. In addition, the parties opposing the duties have not presented themselves in court to counter the claims. To be clear, the grandfathered facilities are grandfathered as to production capacity, so any increase in production capacity at these facilities does not mean increases in potential palm biodiesel importation should the duties be lifted. As such, Clean Fuels recommends EPA revise the discussion starting at l. 465 to reflect the additional trade restrictions that are tantamount to a ban on imported Indonesian palm biodiesel and their likely endurance.

Furthermore, EPA's discussion on the RFS' potentially greater impacts on palm oil production as an enabler of soybean-to-palm oil substitution is similarly misleading. EPA notes that "other factors… have also played a significant role in the increasing imports of palm oil and palm kernel oil,[] there does appear to be an association between the use of soybean oil and FOG to produce [BBD] and palm oil and palm kernel oil imports." Yet, EPA presents no evidence of an association between the two *after controlling* for these other significant factors. There has been a myriad of confounding factors affecting the palm oil market (and other vegetable oil markets) since the implementation of the RFS that make it impossible to attribute increased palm oil imports to the RFS.

First, there is no evidence to what extent, if any, demand for biodiesel and renewable diesel has led to substitution away from soybean oil to palm oil relative to other drivers of substitution. EPA has highlighted this lack of evidence itself elsewhere in this and other ERD chapters.[30] Furthermore, there are other and potentially more significant factors that have led to substitution, such as the FDA ban on trans fats, genetically modified labelling requirements, and changes in preferences due to health concerns.[31] These factors have likely played a greater role in increased palm oil imports and should be considered before attributing any palm oil imports to the RFS. Therefore, EPA should clarify that confounding factors make it impossible to discern the contribution of the RFS to increased palm oil imports without rigorous analysis.

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[27] EPA, "RIN supply as of 2-17-22," *available at* https://www.regulations.gov/document/EPA-HQ-OAR-2021-0324-0647.

[28] ERD at p. 7-20, l. 471.

[29] *Biodiesel CVD Final*, USITC Pub. 4748 (2017).

[30] *See e.g.,* ERD at p. 7-23, l. 536: "… there are far fewer peer-reviewed studies on biodiesel than there are on ethanol, and almost none include FOGs, the BTC, and potential substitution effects in vegetable oil markets, all of which are likely important for understanding this industry;" p. 7-26, l. 625: "While this and other chapters have made claims about the substitutability of different feedstocks into the food, feed, and fuel industries, the authors of this chapter are not aware of sufficiently rigorous studies that have addressed the impact of increasing demand for qualifying feedstocks (such as FOGs or soybean oil) for biodiesel and renewable diesel production on commodities that may be used as substitutes in other industries (such as other vegetable oils, including palm oil);" p. 16-36, l. 840: "… we found no evidence that this mechanism has been a significant driver of palm oil biofuel production in Southeast Asia to date."

[31] D. J. Sanders, J. V. Balagtas & G. Gruere 2014, Revisiting the palm oil boom in South-East Asia: fuel versus food demand drivers, Applied Economics, 46:2, 127-138, DOI: 10.1080/00036846.2013.835479.

Second, there were other significant factors that placed upward pressure on prices of palm oil and palm kernel oil over recent years that are independent of increased consumption of soy biodiesel and renewable diesel.[32] For example, a labor shortage in the Malaysian palm oil industry exacerbated by the COVID-19 pandemic and still rebounding from the lifting of health restrictions[33] has decreased the supply of labor and placed upward pressure on palm oil prices. Palm oil prices rose around the time the labor shortage began, shown in ERD Figure 7.10, prior to increases in soybean oil prices. Consequently, EPA cannot attribute higher palm oil prices to the RFS without considering the effects of these other factors that have affected prices.

Third, there were factors other than demand for biodiesel and renewable diesel that increased soybean oil prices following the COVID-19 pandemic. Record soybean exports to China coupled with the war in Ukraine and drought, led to the spike in soybean oil prices.[34] A recent paper from Purdue University found that crude soybean oil prices have increased by significantly more than what could be explained by increasing biofuel demand, suggesting that other factors contributed to the price increase.[35] Therefore, higher soybean oil prices also cannot be solely attributed to higher biodiesel and renewable diesel demand.

Based on this evidence, Clean Fuels urges EPA to remove any reference to the association between soybean and palm oil prices or between soybean oil use for BBD production and palm oil imports to suggest increased palm oil imports and the attendant induced environmental impacts are attributable to the RFS.

The RtC3 would benefit from an improved discussion of the relationship between the RFS and California's Low Carbon Fuel Standard as well as other state programs.

At ERD p. 7-21, l. 505, EPA states that

> "the potential maximum impact of the RFS program on the domestic production of biodiesel and renewable diesel may be estimated by comparing the total volume of these fuels produced domestically to the volume of biodiesel and renewable diesel required to be used by state mandates … and the volume of these fuels used in states with clean fuels programs or other significant incentives…. It is assumed that the volume of biodiesel and renewable diesel required under these programs would be used in the absence of the RFS program."

EPA cannot, however, derive the maximum, or really, minimum impact of the RFS program on domestic production of bio- and renewable diesel, or BBD, from this assessment. As an initial matter, the difference between the total volume of BBD produced domestically and the volume used to meet state mandates alone may reflect a minimum impact of the RFS on production. This is because the delta does not reflect BBD production that would occur anyway due to state mandates. Other state incentives, such

[32] D. J. Sanders, J. V. Balagtas & G. Gruere 2014.

[33] *See* Chu, Mei Mei, "Labour shortages set up Malaysia for third year of palm oil losses," Reuters (Sept. 7, 2022), https://www.reuters.com/markets/commodities/labour-shortages-set-up-malaysia-third-year-palm-oil-losses-2022-09-07/.

[34] *See* USDA Foreign Agricultural Service, "Record U.S. FY 2022 Agricultural Exports to China," (Jan. 6, 2023), https://www.fas.usda.gov/data/record-us-fy-2022-agricultural-exports-china.

[35] Lusk, Jayson. 2022. Food and Fuel: Modeling Food System Wide Impacts of Increased Demand for Soybean Oil.

as the clean fuel programs on the West Coast, influence BBD production in concert with the RFS mandates.

Moreover, the assumption that the volume of BBD used to comply with California's LCFS would remain the same absent the RFS is incorrect. Renewable Identification Numbers (RINs), LCFS credits, and tax credits stack in California, which impacts the RFS' influence in the program. Absent the RFS, relative incentives for compliance options, i.e., fuel production pathways, would change and therefore so would the compliance mix. Relaxing the RFS would widen the incentive gap for high- and low-carbon-intensity feedstocks and alter the feedstock mix in the state.

Additionally, the ceiling on LCFS credit prices, combined with the fact that BBD is the marginal compliance fuel in the LCFS, would restrict volumes of those fuels from being used at current levels absent the RFS. Under the current U.S. biofuel policy landscape, renewable diesel earns $2.6/gal from D4 RINs, approximately $0.5/gal from LCFS credits, and $1/gal from the Biodiesel Tax Credit (BTC). Without generating RINs, California fuel blenders would lose $2.6/gal in RIN value for biomass-based diesel.[36] Blenders would then require a roughly $430/MT LCFS credit price to supply the same marginal gallon of BBD;[37] however, LCFS credit prices are capped at $200/MT (indexed to 2016 $). As a result, LCFS compliance would be very difficult if not unattainable without the RFS.

While Clean Fuels does not believe this nuance impacts EPA's assessment of the environmental impacts attributed to soy biodiesel's production induced by the RFS, we nonetheless point out these clarifications to improve the value and integrity of the RtC3.

Chapter 8: Air Quality

EPA should incorporate more recent data and industry information on emissions from soy biodiesel.

In Section 8.3.1.2.2, EPA provides information from Argonne National Laboratory's GREET model on emissions from soybean crushing for the extraction of soybean oil to be used in biodiesel production. While EPA explains the three processes for extracting oil from the soybean as provided in the GREET model, it is important to note that soybean processors in the United States serving the biodiesel industry overwhelmingly use solvent extraction, which indicates that emissions from soybean crushing for biodiesel purposes are the lowest of the processes presented. It is unclear how EPA's subsequently referenced model does or does not incorporate this fact. Clean Fuels therefore recommends EPA provide additional information on the connection or absence thereof between the information presented in Figures 8.7 and 8.8 and clarify that soybean processing facilities serving the biodiesel industry use solvent extraction, resulting in the lowest emissions on a per unit basis of the three oil extracting processes.

In addition, at p. 8-23, l. 527, EPA notes that an engine manufacturer has had concerns about the metals content of biodiesel. Clean Fuels is aware of some of the claims made by a small number of engine and original equipment manufacturers (OEMs) concerning the performance of biodiesel. Their unsubstantiated claims revolve around the perception that since the ASTM biodiesel specifications

[36] This assumes a 1.5 equivalence value (EV) for biodiesel, therefore reflecting a minimum since renewable diesel earns a 1.6 or 1.7 EV.

[37] Clean Fuels calculates the $430 value based on back-of-the-envelope assessment that the average gallon of BBD used in CA earned roughly 0.007 LCFS credits in 2021.

(D6751) have limits for metals concentrations, that all metals found in fuels today must arise from the inclusion of biodiesel. The ASTM committees covering these fuel quality specifications have repeatedly asked for data from OEMs that would substantiate their claims and support any restrictions in biodiesel use but have seen none to date. The metals of supposed concern include alkali and alkaline earth metals which are found in engine lubricating oils, fuel additives, other fuel processing units, and even external environmental fuel contaminants, introducing other vectors of the metals' introduction into fuel.
To address the lack of data, Clean Fuels has conducted a fuel quality survey of all biodiesel producers within the BQ-9000 Quality Management Program[38] each of the last five years[39] and found that the average total metals content of biodiesel has been less than 1 part per million (ppm) and that 95% of all the biodiesel surveyed was 2.3 ppm or less. Consequently, Clean Fuels recommends EPA revise this section of the RtC3 to reflect the results and findings of these surveys as well as include the important note that it is entirely possible metals occurring from other sources not attributable to biodiesel can be present and affect fuel metals levels.

EPA should expand its comparison of biodiesel with petroleum diesel at minimum on a per unit basis in Section 8.5 as well as Section 11.5.

While Argonne National Laboratory's GREET model is the preeminent lifecycle assessment model for fuels and transportation, its use in Section 8.5[40] is misleading for purposes of the RtC3. Clean Air Act Section 204 mandates EPA to assess the impacts of the RFS program, which EPA itself interprets to mean the impacts within the four corners of the program since its enactment by Congress.[41] EPA goes to great lengths to isolate and attribute environmental impacts of the program where possible and focuses on the impacts from the total volumes of fuels over time.

When EPA attempts to compare these impacts to petroleum, however, it defaults to using the GREET model and comparing the selected environmental impacts of biodiesel to petroleum on a per unit basis, using average assumptions and inputs from the GREET model, which reflects the most recent average inputs from industry but does not capture the variability or scale of the environmental impacts of biodiesel compared to petroleum. EPA acknowledges that the biodiesel industry cannot match the economies of scale the petroleum industry has accumulated over its century-plus existence, resulting in higher environmental impacts on a per unit basis for biodiesel but makes only a de minimis attempt to consider the larger context of the magnitude of the petroleum industry's environmental impacts relative to the biodiesel industry, the potential variability in inputs to and outputs from GREET, and wholly ignores the important environmental benefits of biodiesel relative to petroleum diesel including the foremost purpose of the RFS: to reduce greenhouse gas emissions.[42] EPA should, therefore, include additional context and scientific literature on the environmental impacts of the petroleum industry and the avoided impacts due to the RFS biodiesel volumes displacing petroleum diesel, much as it does in other contexts relative to greenhouse gas emission impacts.

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[38] Clean Fuels estimates that biodiesel producers participating in the BQ-9000 program represent 90 percent of domestic production volumes. More information is available at https://www.bq-9000.org/.
[39] Results of these surveys can be found in annual reports available at:
https://www.nrel.gov/docs/fy20osti/75795.pdf; https://www.nrel.gov/docs/fy20osti/75796.pdf; https://www.nrel.gov/docs/fy20osti/76840.pdf; https://www.nrel.gov/docs/fy20osti/79815.pdf; and https://www.nrel.gov/docs/fy22osti/83108.pdf.
[40] As well as section 11.5.
[41] ERD at pp. 2-2–4.
[42] ERD at p. 8-46.

EPA should provide additional context to the limitations of the BEIOM biodiesel results presented in Section 8.5 as well as Sections 10.5.1, 11.5, and 13.5.

The National Renewable Energy Laboratory's Bio-Based Circular Carbon Economy Environmentally-Extended Input-Output Model (BEIOM) study on soy biodiesel[43] may not provide accurate results of the environmental impacts from the soy biodiesel industry due to substantial constraints in its methodology. The model relies on North American Industry Classification System (NAICS) codes to delineate economic inputs and environmental outcomes, but the biodiesel industry does not have a NAICS code. The study sought to right-size inputs because of this classification issue by obtaining data on biodiesel production facilities; however, the authors were only able to obtain data from five out of approximately seventy North American biodiesel production plants. The study used weighted averages to scale up these data points to national production numbers, but given the small sample size, it is unlikely those five facilities accurately represent the average biodiesel facility to reasonably be used in this way. Consequently, the environmental outcomes presented in the study are not likely representative of the environmental impacts of the industry. Clean Fuels does agree though with the underlying conclusion from the BEIOM study, namely, that the environmental impacts of the biodiesel industry have decreased on a per unit basis over time; however, presenting the data without limiting its findings to the trends derived and not the total impacts assessed may be misleading. As such, EPA should note these limitations to the results for the biodiesel industry.

Chapters 9–14: Soils and Water Quality, Water Use, and Ecosystem Health and Biodiversity

EPA should revise its newly conducted environmental impact analyses or omit them from the final RtC3.

EPA conducted new analyses on environmental impacts in Chapters 9 through 14 based on the assessed LCLM change reported in the Lark study. As mentioned in our comments on Chapter 5, the LCLM estimates derived from this study should not be used to assess the environmental impacts from biofuels generally or from the RFS program in particular. As such, EPA should omit the consequent analyses in Chapters 9 through 14 because the premise for the location and magnitude of impacts is flawed.
Not only is the underlying premise of these analyses flawed, but the models, scenarios, and assumptions used to conduct them are also deficient. First, to conduct these analyses, EPA relied on the Environmental Policy Integrated Climate (EPIC) model and Soil and Water Assessment Tool (SWAT) in Chapters 9 through 11 and 13 despite these models' data and parameters being severely outdated. For example, EPIC's parameters have not been updated since the 1970s or 1980s.[44] The outdated parameters do not accurately simulate the impact of many factors that have changed since that time, such as the evolution in crop genetics, and therefore likely generate inaccurate results on the impact of LCLM change over at least the past decade. Newer data are available, especially for the crop growth parameters, which indicate that these crops are more efficient in many areas and hence would have less adverse environmental impacts than the ERD presents. Under the "Research Recommendations" sections of the respective chapters, EPA should recommend that the EPIC and SWAT models' parameters be updated with newer and improved measurement data that have been obtained over the last 10-15 years.

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[43] Avelino, AFT; Lamers, P; Zhang, Y; Chum, H. 2021, Creating a harmonized time series of environmentally-extended input-output tables to assess the evolution of the US bioeconomy - A retrospective analysis of corn ethanol and soybean biodiesel. *J Clean Prod* 321: 128890. https://dx.doi.org/10.1016/j.jclepro.2021.128890.
[44] This fact was also noted by the RtC3 peer reviewers.

Moreover, the simulation scenarios and assumptions used to conduct these analyses are flawed. It is unclear whether the simulations capture weather effects that were known to occur during the relevant time period (e.g., drought or excessive rain events), which would impact multiple outcomes such as effects on soil and water quality. The simulations also did not measure the impact of other conservation practices (such as cover crops) that have been implemented in the study's geographic area during that time period and would have also impacted soil and water quality, and ecosystem health. Furthermore, it does not appear that field-level crop and conservation practices were computationally modeled,[45] and this lack of granularity significantly impacts the results. Changes in management practices on soil and water quality and ecosystem health are greatly influenced by topography, soil type, beginning soil and water conditions, and climate. Indeed, location is known to be a more influential factor on soil quality than management practices themselves.[46]

The new analyses modeled the impacts of practices implemented across the entire 8-year study period; however, in reality, environmental impacts of management practices, such as changes in soil organic matter, nutrients, and organisms, arise over multiple decades, as reflected in the EPIC model's design. At the same time, while committed to conservation, farmers may have to make short-term (e.g., one-time) adjustments in management practices due to unexpected events such as extreme weather during the crop year (e.g., excessive rains during planting). These events may cause farmers to deviate from conservation practices for a single year. Modeling management practices over such a short study period and consistently over that period does not reflect reality, increasing the likelihood of inaccurate results. Indeed, the caveats mentioned in the ERD provide their own evidence that the analytical results are of limited value.[47]

Adding to the limited value of these analyses, EPA takes the results and then applies an estimated range of 0-20% to uniformly attribute the environmental impacts to the RFS; however, it is highly unlikely the RFS uniformly impacted LCLM change across the United States, if at all. Even if the estimated range of 0-20% is accurate, the net increase in cropland area due to the RFS most likely impacts different geographic regions of the U.S. differently, further amplifying the inaccuracies of the impact results in these chapters. EPA also identifies additional considerations, providing further evidence of the estimated impacts' utility.[48]

Consequently, Clean Fuels recommends EPA either: (1) revise the analyses conducted by:

a. Reflecting different scenarios or case studies at the field level in which grassland (or perennial land cover) is converted to corn or soybeans in a rotation in different areas of the country (to capture the variability in climate, soil types, watershed, topography, etc.), simulating that change in soil or water quality at the field level,
b. Reporting those field-level estimates of various scenarios located in various, targeted areas on a per acre basis for a cropping system, and
c. Conducting an analysis of market draw areas of grain originators for biorefineries to capture the change in biodiesel production and attendant LCLM change and crop production to assess impacts attributable to the RFS based on regional variation;

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[45] *See e.g.*, ERD at pp. 9-16, ll. 426-427.
[46] Presentation made by Dr. Dan Liptzin titled "Effects of Soil Health Management Systems on Soil Carbon" at Soil Health Institute's 2021 Annual Meeting; Session: Climate Change Mitigation and Adaptation Through Soil Health (https://soilhealthinstitute.org/news-events/2021-virtual-annual-meeting-view-the-recorded-sessions-online/).
[47] *See e.g.,* ERD at pp. 9-16–18, ll. 422–456.
[48] *See e.g.,* ERD at pp. 9-19–20, ll. 491–527.

or (2) omit these analyses entirely for lack of rigor.

Additional Comments on Chapters 9 through 14

Farmers, supported by the public and private sectors through programs like USDA's Climate Smart Commodities and market-based incentives continue to increase their efforts to improve soil and water quality and other environmental outcomes. Their efforts should be acknowledged under the "Likely Future Impacts" sections of each chapter.

Furthermore, oilseed cover crops like camelina, CoverCress™, carinata brassica, and winter canola can and will serve as biodiesel and renewable diesel feedstocks as noted in our comments on Chapter 4, yet EPA does not discuss them in any of the "Horizon Scanning" sections in the Part 3 chapters. These winter annual oilseeds have tremendous potential to enhance soil and water quality while also serving as a BBD feedstock without land extensification. These crops should therefore be discussed throughout these chapters where appropriate.

Finally, Chapters 9–14 contain a potentially overwhelming amount of information that may confuse the audience about the complexity of the relationships conveyed and direction of the environmental impacts. Clean Fuels therefore recommends EPA consider adding diagrams and tables conveying these relationships and direction of impacts. This summary information may serve as a foundation for the audience to understand how LCLM change affects environmental impacts such as soil and water quality.

Chapter 16: International Effects

Clean Fuels agrees with EPA's finding that imported biofuels attributable to the RFS program led to minimal international environmental impacts. EPA should revise its discussion of the role of imported biodiesel to align with this conclusion.

Clean Fuels concurs with EPA's high-level conclusion that "[i]nternational effects associated with imported biofuels … are likely modest … given the relatively small quantity of imports relative to domestic biofuel production since the RFS program went into effect."[49] As EPA notes, total biodiesel imports have virtually stopped from Argentina and Southeast Asia since 2017[50] in response to the countervailing duties referenced in our comments on Chapter 7. As noted in those comments, we anticipate these duties to endure, suppressing the international effects of imported biodiesel attributable to the RFS program into future years.

We therefore suggest, EPA acknowledge the significant role domestic and international trade policies play throughout this Chapter, and in particular in its section on uncertainties and limitations.[51] Similarly, EPA should revise its conclusions at p. 16-2, ll. 38 – 39 and p. 16-41, ll. 981 – 982, that state "a portion of the gross biodiesel imports during 2012–2019, averaging 295 million gallons per year, are reasonably attributed at least in part to the RFS program." As our comments suggest and ERD Section 7.2.6 outlines, many factors influence U.S. imports of biodiesel, and no one factor plays an outsized role. As such, Clean Fuels suggests EPA revises these conclusionary statements to reflect this reality as follows:

> ~~A portion of the~~ gross biodiesel imports during 2012–2019, averaging 295 million gallons per year, **were impacted by several factors, including U.S. domestic policies like** ~~are reasonably attributed at least~~

[49] ERD at p. ES-3, ll. 92–95.
[50] ERD at pp. IS-21–22, ll. 586–589.
[51] ERD p. 16-42, ll. 1018-1025.

> ~~in part to~~ the RFS ~~program~~ **and international factors such as foreign domestic biodiesel subsidies and incentives**.[52]

Similarly, EPA should revise its statement at p. 16-8, ll. 178–179 as follows:

> Agricultural extensification and deforestation have been documented in countries that are major exporters of ~~biofuels~~ **ethanol, and were major exporters of biodiesel prior to 2017,** to the United States, including Brazil, Argentina, and Indonesia**; however, since 2017, biomass-based diesel imports have come primarily from Canada, Singapore, and Germany.**[53]

EPA should remove references to and use of several deficient academic articles in its discussion of the indirect international effects of biodiesel production and the RFS.

EPA spends considerable time and effort discussing palm oil, much like in Chapter 7, and the potential effects of palm oil expansion due to the demand response of increased biodiesel production despite admitting early on that "attribution of palm oil production to the RFS Program in particular, and U.S. biofuel consumption more broadly, is uncertain and unresolved."[54] While Clean Fuels understands and appreciates EPA's concern about the potential indirect environmental effects of the RFS program, we believe several of the studies EPA relies on in this discussion are deficient and that certain of EPA's statements misunderstand the market forces at play and/or are misleading.

First, Clean Fuels suggests that the reference to Santeramo and Searle (2019)[55] be omitted. This study presents estimations of supply elasticities for soybean oil and palm oil; however, the theoretical and empirical framework used in the study is flawed. First, the framework follows the theory and empirical model presented in Roberts and Schlenker (2013),[56] which presents an empirical model for the agricultural commodities – corn, soybeans, and wheat – not oils. Suppliers of commodities (farmers) have different profit maximizing functions than the oil suppliers (oilseed processors). Therefore, the supply functions are inappropriately based on the production of the underlying commodity. They also include the price of one of the coproducts as an endogenous variable, rather than the price of the commodity itself. Consequently, an adequate framework for the study should have been developed on either the supply functions for soybean and palm farmers or for soybean and palm processors and not confused the two. In addition, palm is a perennial crop, taking several years (up to seven) to produce palm oil. Santeramo and Searle only included a single year lag variable to inform their supply functions, which is inherently inappropriate for palm production. If the profit maximizing supply function was representing palm growers correctly, the yield lag variable should have been several years, not a single year. While Taheripour, Delgado and Tyner (2020) [57] discuss other issues with this study, these two

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[52] Struck-through language indicates deletions. Emboldened language indicates additions.

[53] Struck-through language indicates deletions. Emboldened language indicates additions.

[54] ERD at pp. 16-31–32, ll. 711–712.

[55] Santeramo, FG and Searle, S. 2019, Linking soy oil demand from the US Renewable Fuel Standard to palm oil expansion through an analysis on vegetable oil price elasticities. Energy Policy 127: 19-23. https://dx.doi.org/10.1016/j.enpol.2018.11.054.

[56] Robert, M.J., Schlenker, W. 2013, Identifying supply and demand elasticities of agricultural commodities: Implications for the US ethanol mandate. Am. Econ. Rev. 103 (6), 2265-2295.

[57] Taheripour, F., Dalgado, M.S., Tyner, W.E. 2020, Response to Santeramo and Searle (2019). Energy Pol. 137, 111159.

issues alone should invalidate the price and cross-price elasticities for soybean oil and palm oil derived from this study. Consequently, it should be omitted.

EPA should also omit its illustrative estimate of the amount of palm oil that would backfill soybean oil diverted for biodiesel in the United States. Using the FASOM and FAPRI models and cross-price elasticity developed by Santeramo and Searle (2019), EPA estimates that a one-billion-gallon increase in soy biodiesel would increase palm oil imports by 57% ± 45%. Putting aside the incredibly wide range associated with EPA's estimate, the estimate is demonstrably incorrect. First, it relies on the inaccurate cross-price elasticity developed by Santeramo and Searle (2019), as discussed above. More importantly though, recent U.S. soy biodiesel production and palm oil import data show the entire range overestimates induced palm oil imports. Between Marketing Year (MY) 2020/21 and MY2021/22, U.S. soy biodiesel production increased by 0.96 billion gallons[58] while U.S. palm oil imports only increased 1.1% over that time.[59] Even at the lower end of EPA's estimated range, EPA's estimate is an order of magnitude larger than the data suggest. Consequently, EPA should strike discussion of this analysis.
In a similar vein, Clean Fuels also suggests EPA remove the discussion and reference to Cui and Martin (2017).[60] This study models multiple scenarios including the implications of 1.55 billion gallons of soy biodiesel production. The results indicate that the soy feedstock necessary to meet that level of biodiesel production would be sourced between 13% and 15% through increased soybean production and 85–87% through diverting soybean oil from other uses. EPA itself concludes that USDA export data do not support the implications of these results.[61] Indeed, soy biodiesel production in MY2021/22 was 1.66 billion gallons,[62] yet soybean oil production increased 4.5% and its use in U.S. foods increased 0.5%.[63] Consequently, there has been no diversion of soybean oil as implied by this study, and it should therefore be excluded from the final RtC3.

Clean Fuels urges EPA to revise several misleading statements about the attribution of international effects to the RFS program and U.S. biodiesel production.

While we do not dispute that cropland expansion and natural habitat loss have occurred internationally and that increased biofuel production may have contributed to these land use changes, EPA's remarks to this end[64] may be misleading without clarification that biofuel production in general and *not* biofuel production induced by U.S. biofuel policy or the RFS program in particular have demonstrably contributed to these changes. As EPA notes, Argentina and Indonesia have domestic biofuel policies that contribute significantly to domestic biodiesel and biodiesel feedstock supply and the attendant local environmental effects.[65] As such, Clean Fuels recommends EPA revise its statements throughout

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[58] Market View Database, https://marketviewdb.unitedsoybean.org/.
[59] USDA FAS Production, Supply, and Distribution, https://apps.fas.usda.gov/psdonline/app/index.html#/app/home.
[60] Cui, J; Martin, JI. 2017, Impacts of US biodiesel mandates on world vegetable oil markets. Energy Econ 65: 148-160. https://dx.doi.org/10.1016/j.eneco.2017.04.010.
[61] ERD at p. 16-38, ll. 903–905.
[62] Market View Database, https://marketviewdb.unitedsoybean.org/.
[63] USDA FAS Production, Supply, and Distribution, https://apps.fas.usda.gov/psdonline/app/index.html#/app/home.
[64] *See e.g.*, ERD at p. 16-8, ll. 170–172.
[65] ERD p. 16-26, ll. 601–602; p. 16-28, ll. 644–650.

Chapter 16 to clarify that neither U.S. biofuel policy nor the RFS has directly demonstrably contributed to these international land use changes.[66]

Furthermore, EPA should remove misleading statements about coincident increases in U.S. biofuel production to global cropland expansion and the attendant environmental effects.[67] Global dietary energy supply and food security have also increased at the same time as the increases in U.S. biofuel production, yet overall expansion in global cropland area during this time has been minimal.[68] EPA provides no evidence of strong correlation let alone causality, but the audience may be left with the impression that these loose associations represent meaningful correlation or causation without further clarification.

Clean Fuels also suggests EPA reword its statement at p. 16-37, ll. 847 – 857 to describe more accurately the economic principles behind its concern about the RFS program inducing adverse environmental impacts internationally and reflect the end-users' impact on the causal chain discussed. First, it is changes in demand for edible vegetable oil that may induce substitution of other vegetable oils for soybean oil, not simply the increased volumes of BBD. Direct consumption of vegetable oils, primarily soybean oil, by end-users or consumers is a small share of the vegetable oils market, and there is little to no direct consumption of palm oil in the United States. Therefore, consumers do not play a significant role in the direct demand for soybean and palm oils. Rather, as noted in our comments on Chapter 7, food manufacturers and food service companies are the predominant end-user of these oils, and their decisions on which vegetable oils to use are based on a multitude of factors including physical, chemical and taste properties of the oils, availability, and, to be sure, also price. It takes months or years to reformulate processed foods containing vegetable oils, however, so vegetable oil substitution is a more strategic and complicated decision than the ERD lets on. These confounding factors should be noted in the final RtC3 to capture the complexity of vegetable oil markets and the range of factors impacting one of biodiesel's feedstock markets. Consequently, we suggest EPA revise this statement as follows:

> "Economic principles suggest that, all else equal, ~~higher renewable biodiesel volumes put~~ **increased demand for biomass-based diesel puts** upward pressure on the price of ~~vegetable oil by increasing the demand for vegetable oil feedstock[21]~~ **biomass-based feedstocks by increasing the demand for the feedstocks**. ~~When soybean oil prices increase relative to other vegetable oils, consumers who can, may shift some of their consumption to other oils~~ **As a prominent biomass-based diesel feedstock, when soybean oil prices increase relative to other vegetable oils, food manufacturers who can may shift some of their demand for soybean oil to other vegetable oils**, such as...."[69]

Based on these nuances and others discussed in our comments on Chapters 4 and 7 regarding the soybean and soybean oil/palm oil markets, Clean Fuels urges EPA to revise its discussion of estimates

[66] EPA should strike the language "could be significant and" from p. 16-41, l. 989, where the evidence provided in the ERD affirms the uncertainty of the international effects and the merits of further research but does not sufficiently indicate that the RFS program has significant international effects.

[67] *See e.g.*, ERD at p. 16-8, ll. 175–177; p. 16-25, ll. 575–577.

[68] *See* U.N. Food and Agriculture Organization, Statistical Pocketbook: World Food and Agriculture 2022, Figures 4, 25, and 27, *available at* https://www.fao.org/3/cc2212en/cc2212en.pdf.

[69] Struck-through language indicates deletions. Emboldened language indicates additions.

presented from FAPRI-CARD and its 2010 report[70] to highlight the limitations of these results, which do not capture the complexities of vegetable oil supply, demand, and substitutability, such as the impacts of the U.S. ban on partially hydrogenated oil use in foods.

Clean Fuels recommends EPA review our comments on Chapters 4 and 7 as they are relevant to EPA's assessments, and reflect our concerns, on Chapter 16 as well.

Lastly, Clean Fuels concurs with EPA's recommendations that significantly more data on agricultural land management, land area cover changes, and more are needed. We suggest EPA add to its list of recommendations that simulation modeling efforts be adapted and updated to account for the complexities of the current global vegetable oil markets as we have discussed throughout our comments here. In the meantime, we urge EPA to acknowledge the limitations of the many studies to date. The gaps in this literature should serve as opportunities for improved and more robust future research.

[70] *See* ERD p. 16-37, ll. 906–918.