March 18, 2025

William Hohenstein
Director
Office of Energy and Environmental Policy
Office of the Chief Economist
United States Department of Agriculture
1400 Independence Avenue SW
Washington, DC 20250

Docket ID No. USDA-2024-0003

Submitted via Federal Portal: www.regulations.gov

RE: USDA Technical Guidelines for Agricultural Crops Used as Biofuel Feedstocks and Feedstock Carbon Intensity Calculator (FD-CIC)

Dear Director Hohenstein:

On behalf of the members of the American Coalition for Ethanol (ACE), I appreciate the opportunity to comment on the United States Department of Agriculture (USDA) technical guidelines for quantifying, reporting, and verifying greenhouse gas (GHG) emissions associated with agricultural production of biofuel feedstocks.

ACE is a grassroots advocacy organization, powered by rural Americans from all walks of life who have built an innovative industry that delivers homegrown and low carbon biofuel and food for a growing world. Our members include U.S. ethanol biorefineries, investors in biofuel facilities, farmers, and companies that supply goods and services to the U.S. ethanol industry.

Overall, we support USDA's interim rule and commend officials in the department who contributed to the technical work product, particularly in the Office of Chief Economist. The technical guidelines generally align with the feedback we submitted in July 2024 in response to the department's request for information and sufficiently inform corn, sorghum, and soybean farmers how individual conservation practices they adopt in their fields can reduce the carbon intensity (CI) of their crops.

ACE applauds USDA for recognizing and scientifically documenting the value individual conservation practices, such as reduced tillage, have on reducing the CI of crop production, and as a result, the overall CI of any biofuel produced from that crop. As you know, the predominant criticism of the guidance for the 40B sustainable aviation fuel (SAF) credit was the impractical all-or-none bundling requirement for conservation practices. The fact that USDA's new guidelines do not impose this bundling requirement demonstrates the department responded to our concerns and feedback about 40B, engaged experts at the Department of Energy's (DoE) Argonne National Lab and land-grant university soil scientists, and responded with a practical approach enabling farmers to select practices which work best with their soil types and crops.

Among the most positive features of the USDA guidelines is the ability for farmers to "stack" or combine practices if they choose, for example reduced-tillage and nutrient management on the same field of corn, and do not artificially limit or cap the carbon credit values that can be derived from individual and stacked practices through the new Feedstock Carbon Intensity Calculator (FD-CIC). We have identified some areas in which the FD-CIC should be improved, including accounting for specific crop yield, climate, soil, and management-specific estimates of nitrogen use efficiency and nitrous oxide emissions. For example, matching the N fertilizer rate, timing, source, and placement to the crop need, soil, and climate can reduce the fertilizer requirement and nitrous oxide emissions. We discuss these in greater detail below.

ACE implores USDA to engage the Treasury Department to ensure these technical guidelines and final and improved FD-CIC are fully incorporated into their final regulations to implement the 45Z clean fuel production tax credit. Moreover, these tools should apply beyond 45Z. To that end, we also encourage USDA to engage clean fuel market regulators (i.e. California Low Carbon Fuel Standard, Oregon Clean Fuel Program, Washington Clean Fuel Standard, New Mexico Clean Transportation Fuel Program) about how to apply the guidelines and FD-CIC in a consistent manner to enable monetization of farm-level practices in those jurisdictions. As you may know, many other states are considering the establishment of clean fuel markets, and these guidelines should be helpful to them as well.

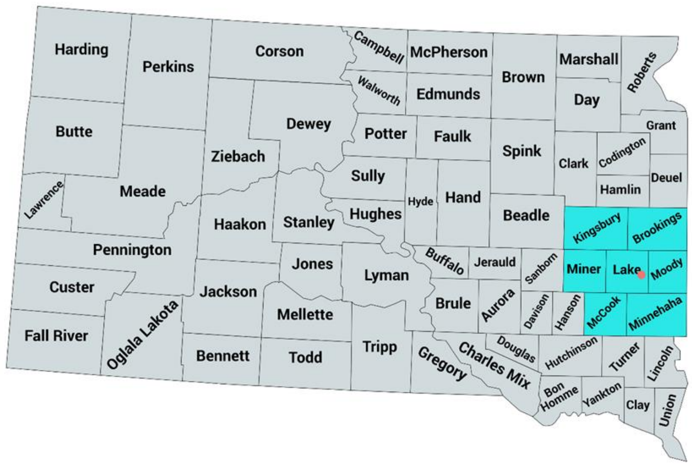
We also strongly recommend USDA routinely update FD-CIC values for low carbon farming practices by incorporating the best available science and results from real-world activities such as the two USDA-Natural Resource Conservation Service (NRCS) Regional Conservation Partnership Programs (RCPPs) currently being led by ACE. These projects are specifically designed to address the perceived need by some entities for more empirical data on the CI benefits of conservation practices and help improve the accuracy of the DoE Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model. We are grateful USDA's guidelines cite the ACE-led RCPP projects as valuable resources to update CI values for conservation practices and appreciate the dialog between USDA and ACE on how our RCPP projects can be helpful to farmers and biofuel producers and look forward to continued engagement.

Below are additional and specific comments on USDA's guidelines and FD-CIC.

<u>ACE-led USDA Regional Conservation Partnership Program (RCPP) Projects</u>

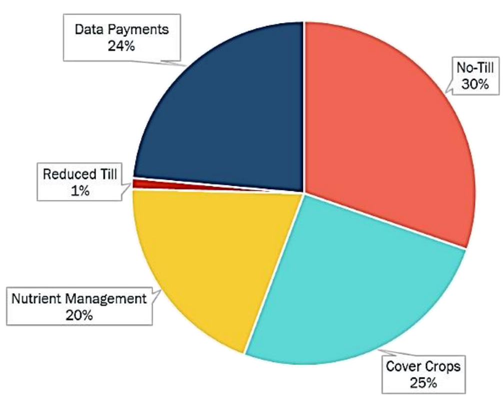
Thanks to funding support from USDA-NRCS, ACE is leading two RCPP projects, in collaboration with top land-grant scientists and DoE's Sandia National Lab, to provide farmers with critical financial assistance to adopt key conservation practices supplemented by efforts to validate and improve upon the current predictive model results of conservation practice adoption showing meaningful GHG benefits of reduced tillage, cover crops and nutrient management on ethanol's carbon footprint. Our RCPP projects are designed to benefit farmers and rural communities over the long term by monetizing farm-level practices.

In 2021, NRCS provided ACE with $7.5 million in RCPP funds to work with a member ethanol company (Dakota Ethanol, LLC) and farmers in the counties surrounding the facility to: (1) incentivize farmer adoption of low carbon farming practices at scale, (2) partner with leading land-grant university scientists and Sandia National Laboratory to collect data to measure, verify and model resulting soil health and GHG benefits, and (3) use this data to help participating farmers access clean fuel markets and take advantage of other opportunities to monetize conservation practices.[1]



Since the launch of this South Dakota-based RCPP, ACE and our partners have successfully executed contracts with farmers in the seven counties (see map) surrounding Dakota Ethanol, LLC to adopt conservation practices on nearly 28,000 acres of cropland (see chart).

Total of 27,640 Acres Under Contract



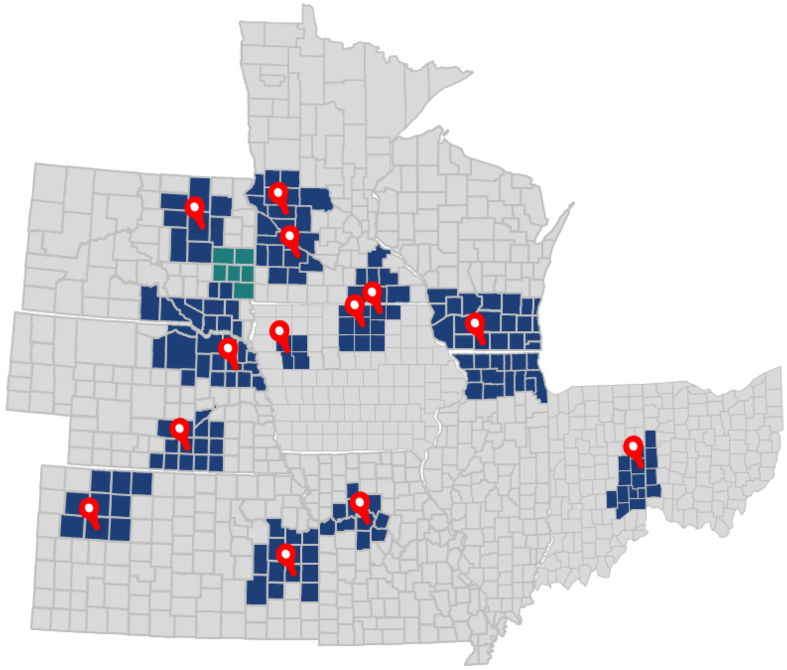
[1] https://ethanol.org/ace-news/usda-announces-investment-in-effort-to-utilize-climate-smart-practices-to-secure-market-access-to-clean-fuel-markets-for-farmers-and-ethanol-producers

Currently, our technical team, led by Dr. David Clay, South Dakota State University Distinguished Professor of Soil Biogeochemistry and Editor-in-Chief of the American Society of Agronomy, is conducting detailed measurements and modeling on the impact of conservation practices on carbon dioxide and nitrous oxide emissions. Their research measures CO_2 and N_2O emissions every 4 hours in replicated plots that have different conservation practices. One of their findings was that rye as a cover crop between two corn crops reduced N_2O emissions 34% in South Dakota. This research filled a knowledge gap and attributed the N_2O emissions to the cover crop, changing the soil biota and resulting in increased reduction of N_2O to N_2 (https://doi.org/10.1002/agj2.21185; https://www.nature.com/articles/s41598-025-93198-9).

Another finding was South Dakota N rates for no-till corn production can be reduced 25% without sacrificing yields ((https://acsess.onlinelibrary.wiley.com/doi/10.1002/agj2.70025). This reduction was attributed to the impact of no-till on soil health. Based on this information, the SD N recommendation and associated NRCS-590 was modified. Additional research using state-of-the-art measurement techniques on the use of no-till, different N sources, fertilizer timings, and fertilizer rates on yields and N_2O and CO_2 emissions are being conducted. Our goal is to use findings from these detailed and on-farm studies to validate existing models which in turn will be used to make reimbursement payments for conservation practices deployed by participating farmers. Our technical team will also use biogeochemical modeling (an ensemble of three biogeochemical models: DAYCENT, Ecosys, and DeNitrification-DeComposition) from sampling farmers within RCPP project area.

Based on the progress we have made in South Dakota, early in 2024, NRCS invested an additional $25 million for a larger 10-state RCPP led by ACE.[2] The USDA funding will help hundreds of farmers adopt reduced and no-tillage, nutrient management and cover crops on nearly 100,000 acres across 167 counties surrounding 13 ethanol facilities partnering with ACE to implement the project in Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, Ohio, South Dakota and Wisconsin (see map below). The sites were strategically chosen to provide our project's scientific team with statistically significant data regarding the GHG effect of conservation practices in different soil types and climates.

[2] https://ethanol.org/ace-news/ace-announces-project-to-unlock-ethanols-access-to-new-markets-and-tax-credits



ACE and our partners will accomplish three important objectives with the 10-state RCPP project. First, we will incentivize farmers to adopt conservation practices using RCPP funding. We have already conducted farmer outreach in all 13 grainsheds via meetings which have been attended by more than 700 farmers who have expressed interest in enrolling approximately 500,000 acres in our project, which is five-times more interest than available funding. We are on pace to be able to execute initial contracts with farmers this spring for cover crop practices in the fall and remaining practices beginning in calendar year 2026 for a five-year period.

Second, our team of soil scientists and agronomists will monitor, measure and verify how the conservation practices adopted by the farmers reduce GHG emissions from corn production. A statistically relevant number of annual soil samples will be collected throughout to ensure scientific rigor of the project findings. Soil information collected will include bulk density, soil texture, soil water, pH, organic matter carbon, and nitrogen and phosphorus concentration. Information related to farm management will also be requested from farmers taking part in our project. This includes planting and harvest dates, crop yield, nutrient application rates, management history, and tillage type. In addition, weather information will be collected each crop year related to temperature, precipitation, wind, and humidity. Each of these factors is necessary to help validate the predictive model carbon results.

The data they collect will be shared with DoE to pressure test existing models such as GREET to address real and perceived ‘information gaps’ which currently prevent farmers and ethanol producers from adequately monetizing low carbon feedstocks.

To that end, the third and final goal of our project is to develop an open-source tool which can be used by all farmers and ethanol producers to meet low carbon biofuel feedstock quantification and verification requirements so farmers can monetize the conservation practices. While proprietary quantification and verification systems designed by private companies for voluntary markets tend to siphon significant value away from farmers for GHG reductions, our RCPP projects will create a non-proprietary agro-ecosystem tool that can be used by all farmers and ethanol producers to maximize opportunities in regulated clean fuel markets. The ultimate objective of our RCPP projects is to empower ethanol producers and farmers with modeling and calculator tools to earn higher tax credits and premium prices in clean or low carbon fuel markets based on conservation practices.

Scientists and lifecycle modelers indicate crop type, soil type, precipitation, and temperature are essential factors used to determine the GHG benefits of conservation practices. These same modelers and market regulators are sometimes reluctant to assign carbon credits for farm-level practices without more locally verified data upon which to validate the GHG benefits. Our 13-grainshed, 10-state project was designed to take into consideration how different crops grown in different soils, with different temperature and precipitation conditions impact the GHG benefits of these agriculture practices. What's more, our project includes an experienced team of scientists from land-grant universities and the DoE's Sandia National Lab who have developed a proven mechanism to collect data from farmers in the 167 counties and assess the real-world carbon sequestration and reductions in carbon dioxide, methane and nitrous oxide emissions from the conservation practices and validate them at a high-confidence level required by modelers and market regulators.

We urge USDA to update credit values for individual conservation practices by incorporating results and data collected through ACE's RCPP projects with USDA and DoE, and to engage Treasury on how we can help inform more accurate and updated GHG credit values for conservation practices.

Definitions for Terms Relevant to Agricultural Production and Biofuel Feedstock Production

USDA's guidelines are appropriately based on agricultural practice definitions from existing NRCS conservation programs. These NRCS definitions and practice codes are well-established and understood by farmers and other stakeholders.

Applicable Crops

Most ACE-member ethanol producers rely on corn and sorghum as feedstocks, and we support inclusion of these crops in the USDA guidelines. Going forward we believe all biofuel feedstock crops and practices that are currently accounted for in GREET's version of the FD-CIC should be eligible to earn GHG reduction credits.

USDA has wisely recommended allowing for the commingling of crops grown by so-called "conventional" means with crops produced using low carbon or conservation practices, as it is impractical to require the segregation of crops after harvest and through the supply chain. As USDA correctly indicates, commingling crops using different management or production practices is standard operating procedure and a weighted-average approach can be taken to account for CI.

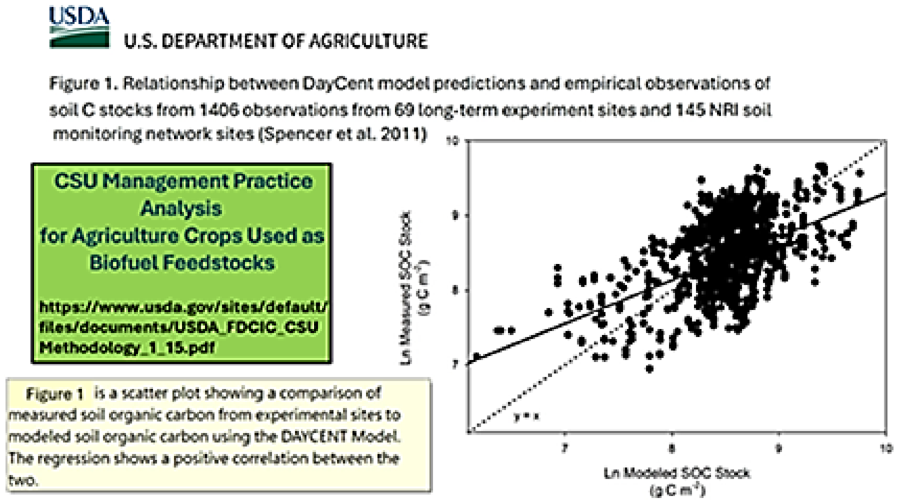
<u>Quantification of Farm-level Crop-specific Carbon Intensities</u>

One of our top priorities is for USDA to routinely update FD-CIC values for low carbon farming practices by incorporating the best available science and results from real-world activities. Under the ACE-led RCPP projects, Sandia National Lab will conduct biogeochemical modeling (an ensemble of three biogeochemical models: DAYCENT, Ecosys, and DeNitrification-DeComposition) from sampling farms within our 10-state, 167-county project area. The results from these models will then be aggregated to calculate the mean value and 95% confidence to quantify changes in crop productivity, soil organic carbon and GHG emissions due to adoption of different conservation management practices in the RCPP project area. The models will also be used to show individual farmers how changes in their management practices could improve soil and economic health. Findings from these assessments will be shared one-on-one in meetings between the project and farmers. Ultimately, our goal is to empower the farmers and ethanol producers participating in our RCPP projects to use this data to qualify CI reductions in low carbon fuel markets, and we offer to share the results with your team to assist USDA in taking an iterative approach to making sure CI values reflect real-world activity. To the extent there are “data gaps,” we are confident our RCPP projects can help solve for many of those needs.

Every point of CI has value under clean fuel programs and tax credits such as 45Z, so exclusion of any GHG reduction factor will result in an incomplete and inaccurate CI score and deny biofuel feedstock producers access to credits that reduce GHGs per unit of energy production while producing feedstocks. We will discuss this in greater detail in the FD-CIC portion of the comments, but GREET’s version of the FD-CIC currently accounts for most of the GHG feedstock production energy yields and emissions, including feedstock yield, biofuel yield of the feedstock, the amount and types of fuels and energy sources, fertilizers and lime, herbicides, insecticides, and soil GHG emissions (nitrous oxide and carbon dioxide emissions) resulting from the use of nitrogen fertilizers and lime. Feedstock yield is of particular importance because it has such a significant impact on overall CI for biofuel feedstocks. It is imperative for USDA to ensure its version of the FD-CIC also accounts for all of these factors.

We applaud the technical analysis USDA has done with other scientific experts, such as Dr. Stephen Ogle’s team with Colorado State University/National Renewable Energy Lab, especially with respect to exceptional soil organic carbon (SOC) sequestration modeling and documentation of the extent and durability of U.S. cropland SOC stock increases due to reductions in tillage intensity.[3] The chart below illustrates significant correlation between modeled SOC sequestration estimates from conservation practices and actual measurements of SOC sequestration from those practices.

[3] “Documentation of Literature, Data, and Modeling Analysis to Support the Treatment of Conservation Practices that Reduce Agricultural Soil Carbon Dioxide and Increase Carbon Storage.” https://www.usda.gov/sites/default/files/documents/USDA_Durability_WhitePaper_01_14.pdf



<u>Verification and Record Keeping</u>

It is critical for USDA and any other regulatory body, such as Treasury, to minimize administrative burdens for verification and recordkeeping and not "reinvent the wheel." With respect to verification of conservation practices by farmers, USDA has a long track record of stewarding federal taxpayer funds for commodity and conservation programs, ensuring that participating farmers meet necessary requirements to receive federal funds. If existing USDA protocols are sufficient for verifying the distribution of billions of taxpayer dollars for commodity and conservation programs, USDA protocols are equally sufficient for verifying the same conservation practices for federal tax incentives such as 45Z. The Treasury Department should rely on existing USDA assets in the reporting and verification for the 45Z tax credit, and we encourage USDA to directly engage Treasury with respect to its expertise and experience in this area.

While USDA, itself, is the expert in understanding how to leverage its various agencies manpower, resources, and systems in this effort, we want to highlight the substantial tools and resources at USDA's disposal.

Since 1985, USDA has been required to ensure that farmers meet specific conservation requirements on their lands to be eligible for federal farm programs administered by USDA's Farm Service Agency (FSA), Risk Management Agency (RMA) and NRCS. Known as "conservation compliance," Congress wanted to ensure that federal farm programs did not entice farmers to grow crops on highly erodible lands or convert wetlands for agricultural production.

Farmers who fail to abide by these rules are ineligible for federal farm programs including FSA loans and disaster assistance payments, NRCS and FSA conservation benefits, and Federal crop insurance support. Under federal regulation, farmers and affiliated persons must affirmatively attest (form AD-1026) that they will not plant or produce an agricultural commodity on highly erodible land without following an NRCS approved conservation plan or system, plant or produce an agricultural commodity on a converted wetland, or convert a wetland which makes the production of an agricultural commodity possible. Additionally, activities that may affect compliance such as removing fence rows, combining fields, or conducting drainage activities must be pre-approved by USDA to ensure compliance.

USDA's FSA and NRCS are tasked with ensuring eligibility. Leveraging nearly 10,000 staff in state and county offices, NRCS is responsible for making technical determinations of compliance at the farm level and FSA's staff of nearly 7,000 state and county offices use this information to make program eligibility determinations for the covered programs. In 2020, USDA ensured the eligibility of 1,095,270 recipients of Farm Bill commodity program payments totaling $34.01 billion in federal dollars. The same year, UDSA ensured the eligibility for 2,185,728 crop insurance policies with payouts of $6.3 billion.

From 2017 to 2023, USDA's NRCS provided $12.9 billion in conservation payments to U.S. farmers for the voluntary adoption of conservation practices working on average with over 325,000 farmers annually.

One of the largest conservation programs NRCS administers is the Environmental Quality Incentives Program (EQIP), which provides money and technical help to farmers to plan and implement many of the same conservation practices, namely cover crops, reduced-tillage, no-till and nutrient management, which are outlined as eligible under USDA's technical guidelines for biofuel feedstocks and FD-CIC. Under EQIP, NRCS has developed extensive national practice standards for each approved conservation practice that are then further refined into state-specific practice standards to meet state and local requirements which may be more restrictive than the national criteria.

For example, the national practice standard for what is required of farmers adopting cover crops under EQIP runs seven pages long and includes considerations for wind and water erosion, soil moisture, soil compaction, nutrient use, soil organic matter content, among others. In each state, farmers must meet state-based specifications for seeding rate, seeding date, cover crop varieties, planting and termination methods to meet the environmental outcome. Each of these requirements is evidenced by seed tags, receipts or visual inspection as part of the USDA reimbursement process.

We also strongly believe tillage intensity should be determined and validated by using the USDA NRCS Soil Tillage Intensity Rating (STIR) method.

Farmers understand and accept USDA's system, which is why it should be leveraged for 45Z implementation instead of re-inventing the wheel with a new, expensive, and unreliable system. From 2017 to 2022, NRCS distributed over $5 billion in EQIP incentives in 205 different practice areas. NRCS has specific, state-based environmental standards farmers must meet when implementing the practice. NRCS, or its partners, are responsible for documenting that farmers have complied with the standards yearly, prior to USDA authorizing taxpayer funded conservation payments to participating farmers, including those USDA guidelines suggest should be incorporated in 45Z.

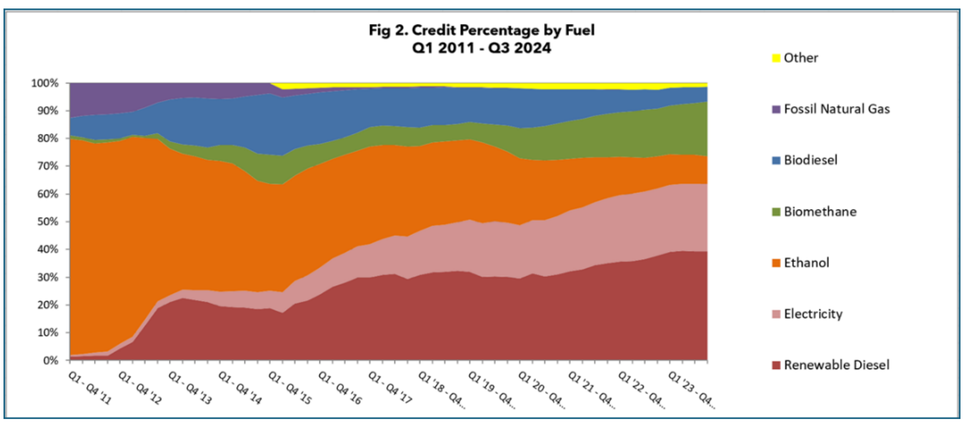
Chain of Custody

While USDA has recommended a mass balance chain of custody approach, the department notes many stakeholders, including ACE, prefer a book-and-claim system because it is more practical, reduces compliance costs, and is likely to result in the adoption of more low carbon production practices by farmers. Under this approach, farmers could "de-couple" the CI attribute of their biofuel feedstock crop from the physical bushel.

Under book-and-claim, farmers could obtain a certificate verifying they produced a biofuel feedstock crop via conservation or low carbon practice(s). The physical bushels could be decoupled from the low carbon attribute and marketed by the farmer in the most efficient means, such as a local cattle feedlot or grain elevator. The low carbon certificate or attribute could then be marketed to a biofuel producer. In other words, a biofuel producer could book bushels of low carbon crops through the purchase of the certificate and claim the CI benefit or credit when selling ethanol. Through the purchase of the certificate, the biofuel producer owns the CI benefit without physically possessing the bushels.

This approach is commonly allowed for the generation of renewable energy credits from low carbon electricity production.

Another example of the advantages and efficiencies of a book-and-claim system is the rapid adoption of "biomethane" production, commonly known as renewable natural gas (RNG). Under the California Low Carbon Fuel Standard (LCFS), RNG qualifies for credit generation using book-and-claim. As a result, livestock producers from the furthest reaches of the country are allowed to produce biomethane from their manure handling facilities, inject it into a local natural gas pipeline, and earn credits under the LCFS. Below is a chart illustrating the substantial increase in biomethane credit generation under the LCFS in recent years.



Had the California LCFS demanded a direct linkage between biomethane production and the use of that product in California, one can reasonably conclude biomethane production would not have increased as rapidly.

Strict traceability schemes come at a significant cost. For example, unlike biomethane, the California LCFS does not allow corn kernel fiber (cellulosic ethanol) produced in the Midwest to comply using book-and-claim. Instead, this low carbon corn kernel fiber ethanol must be segregated from corn-starch derived gallons and shipped in separate rail cars to California. This restrictive approach reduces efficiency and increases the overall CI.

Standards for Reduced-Till, No-till, Cover Crops, and Specified Nutrient Management Practices

We generally support the USDA's reliance of existing NRCS practice standards cover crops and the specified nutrient management practices allowed under the guidelines, including specific STIR ratings for reduced-till and no-till. Our RCPP projects also follow these NRCS guidelines, though there can be state-by-state differences in these protocols based on specific conservation needs.

While USDA is proposing to prohibit grazing of cover crops, in compliance with existing NRCS guidelines, our RCPP projects allow grazing later in cover crop cycle where at least 50%of vegetation remains after grazing. One of the scientific discoveries from our RCPP projects will be more certain CI metrics when comparing grazing versus not grazing cover crops. We would encourage USDA and Treasury to not permanently foreclose the potential to allow grazing in the future as long as accurate CI measurements can be validated.

4R nutrient management

4R nutrient management refers to the right N source, at the right rate, at the right time, and at the right place. It would be easy if a standard N management practice worked for all farms. However, a one-size-fits-all approach is not available. Our RCPP projects will work with individual farmers to implement practices that are appropriate on their farm. These practices may involve using an inhibitor or coated fertilizer on some farms or split applying the fertilizer on other farms. The appropriate practices are site specific. For example, on a sandy soil located in central Minnesota, Clay et al. (1990) showed that treatment of urea with a hydrolysis inhibitor (NBPT) reduced ammonia volatilization by 100 times over untreated urea.[4] Conducting experiments across the 10-state RCPP region will help provide detailed information needed for model validation.

"Permanence"

USDA received several comments in response to its request for information in 2024. Some stakeholders apparently raised the concept of carbon sequestration "permanence" and suggested the need to monitor practice duration for potential reversals. We discourage application of permanence police. Existing NRCS practice verifications and guidelines are sufficient to ensure consistent implementation of reliable GHG emission quantification.

[4] Clay, D.E., G.L. Malzer, and J.L. Anderson. 1990. Ammonia volatilization from urea as influenced by soil temperature, soil water content, and nitrification and hydrolysis inhibitors. Soil Sci. Soc. Am. J. 54:263-266.

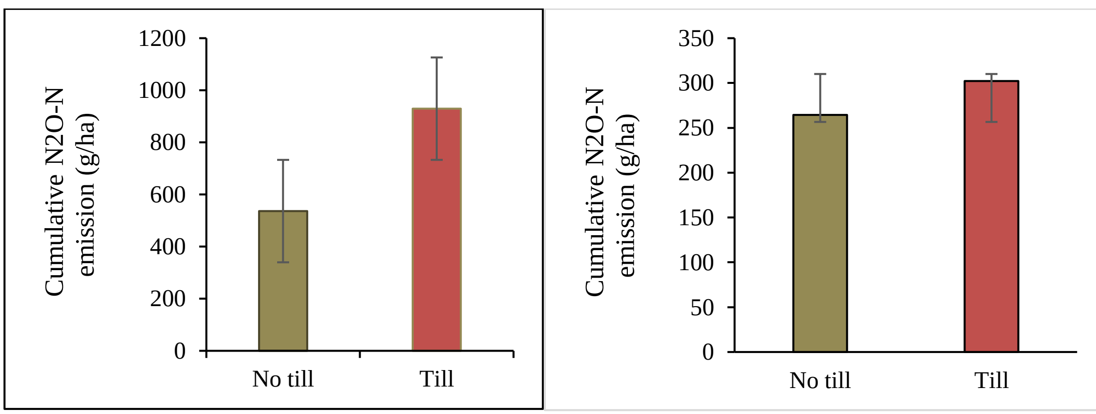
<u>Feedstock Carbon Intensity Calculator (FD-CIC)</u>

The beta version of USDA's FD-CIC has been tested by ACE's leading CI expert, Ron Alverson, a board director representing Dakota Ethanol, and he finds it a very useful and fair tool for properly assessing the GHG credit value of individual and stacked conservation practices.

We compliment USDA and Dr. Stephen Ogle's team at CSU/NREL for making reduced tillage the "default" tillage practice in the FD-CIC. This is clearly justified by the USDA Census of Ag and USDA Economic Research Service tillage survey data.

Mr. Alverson has helped identify some areas we believe need to be addressed or improved for the final version of the FD-CIC.

First, while USDA's technical guidelines correctly indicate the practice of no-till increases SOC as a result of decreased soil disturbance and ***decreases nitrous oxide (N_2O) emissions due to changes in the soil environment when compared to both reduced till and conventional tillage***, when the FD-CIC was used modeling no-till and reduced-till, the FD-CIC <u>increases</u> N_2O emissions by approximately 6%.[5] This seems inconsistent and needs to be addressed in the final FD-CIC. Below find some preliminary data from South Dakota State University showing the effect of tillage on N_2O-N emissions.



Soil cumulative N_2O-N (gm per hectare) emission, (a) in year 2023 and (b) in year 2024, from till and no till treatments under no-nitrogen fertilized condition.

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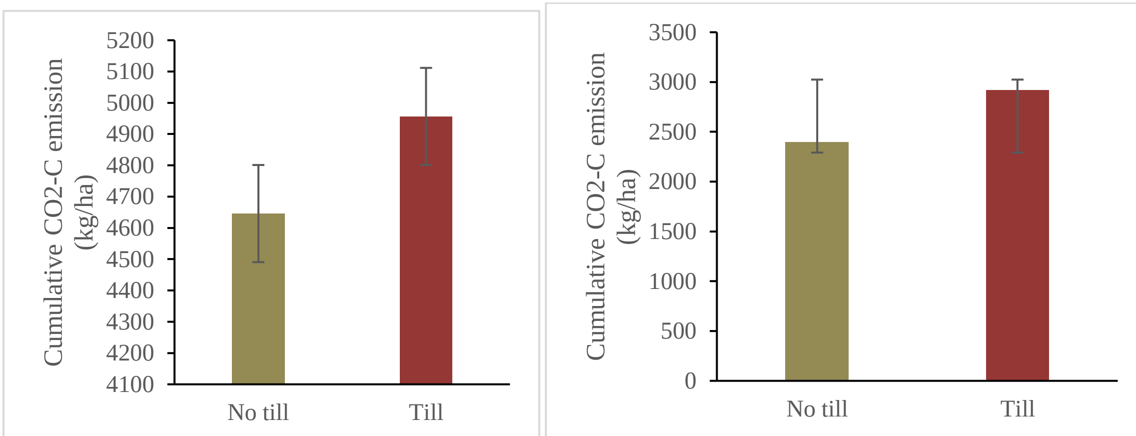
[5] See USDA NRCS, *Conservation Practice Standard Residue and Tillage Management, No Till,* September 2016, https://www.nrcs.usda.gov/sites/default/files/2022-09/Residue_And_Tillage_Management_No_Till_329_CPS_0.pdf.
See also *NRCS Conservation Practices and Greenhouse Gas Mitigation Information dashboard*. https://publicdashboards.dl.usda.gov/t/FPAC_PUB/views/NRCSConservationPracticesandGreenhouseGasMitigation/MitigationSummaries?%3Aembed=y&%3AisGuestRedirectFromVizportal=y#3.



Soil cumulative CO_2 (kg per hectare) emission, (a) in year 2023 and (b) in year 2024, from till and no till treatments under no-nitrogen fertilized condition.

Second, we believe FD-CIC nitrous oxide emissions modeling needs significant improvements. For example, both direct N_2O (particularly from denitrification) and indirect N_2O (particularly leaching loss) are greatly influenced by growing season precipitation and crop evapotranspiration. In Western areas of the corn belt, where growing season precipitation is commonly in deficit, soils seldom experience denitrification conditions (warm, waterlogged soils for several days at a time during the growing season) nor nitrogen leaching losses. Other corn belt areas experience conditions favorable to denitrification related N_2O emission production and leaching loss, yet, the FD-CIC default suggests N_2O emissions across the entire U.S. corn belt are uniform.

Furthermore, recent meta-analysis indicates N_2O emissions from the nitrogen in crop residues are significantly impacted by the crop stage of maturity at harvest and the carbon-to-nitrogen ratio of the crop residue. For example, if crops are mature at harvest and the C:N ratio is 55:1 or higher, N_2O emissions from the nitrogen in residues are negligible. Corn and sorghum fit this category.[6]

Third, we believe the science supports the inclusion of split in-season nitrogen application and nitrification inhibitors in the FD-CIC. Research indicates these tools reduce leaching, nitrification, and denitrification-derived nitrous oxide emissions.[7] Eagle et al conducted a meta-analysis of various

[6] https://www.sciencedirect.com/science/article/piiS0048969721076105

[7] Eagle et al. 2017
https://www.researchgate.net/publication/320366050_Fertilizer_Management_and_Environmental_Factors_Drive_N_O_and_NO_Losses_in_Corn_A_Meta-Analysis

nitrogen management methods to reduce leaching losses and N_2O emissions. We share two of their key meta-analysis findings below:

- Additive N_2O reduction value of using Nitrification Inhibitors with Split-applied (side-dress) Nitrogen (Figure 4 on page 1197)

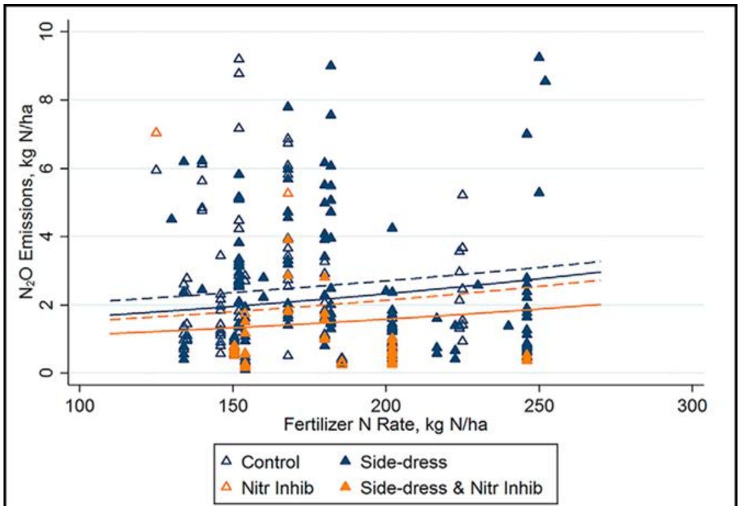
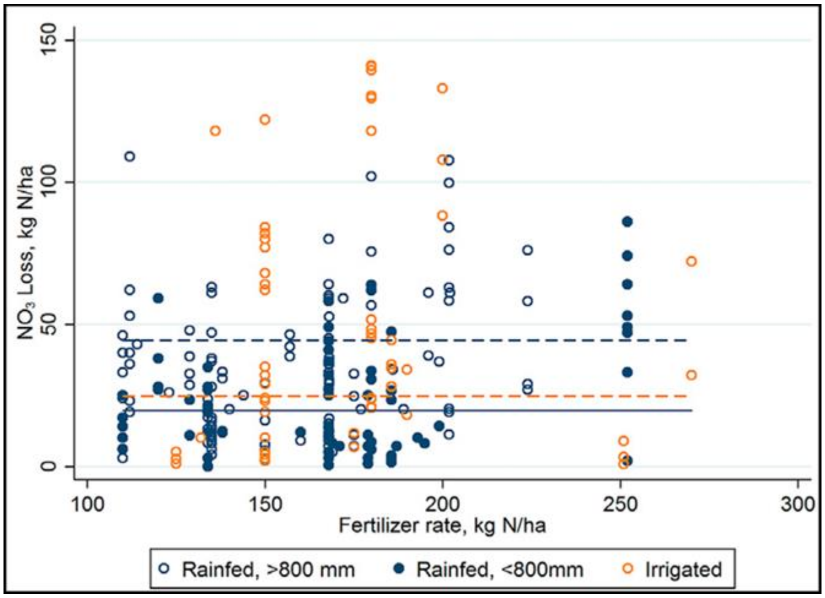
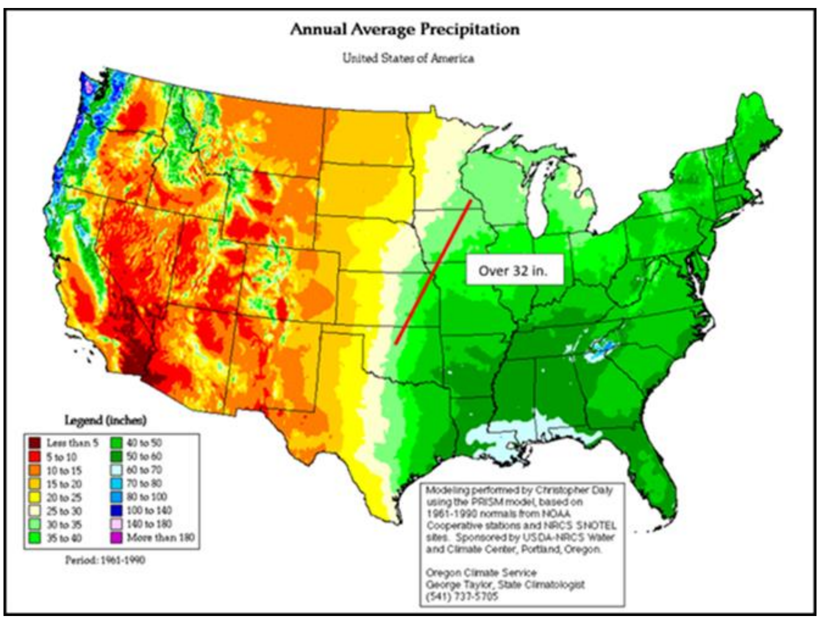


Fig. 4. Nitrous oxide emissions in response to fertilizer N rate, nitrification inhibitors, and side-dress timing of N fertilizer. Observations (triangles) and modeled lines (N_2O Model 3) originate from corn field experiments in North America for which yield data are available, and are limited to those with fertilizer N application rates between 110 and 270 kg N ha^{-1} yr^{-1}.

- Nitrate leaching discussion on page 1196. "Areas with greater natural precipitation experienced higher losses (figure 5 on page 1198); rain-fed sites with more than 800 mm (31.5 inches) of annual precipitation lost an average of twice as much (25 kg N ha^{-1} yr^{-1} more) NO_3 by leaching than non-irrigated sites with less than 800 mm annual precipitation."





To reinforce one of our top priorities; USDA should routinely update its values for low carbon farming practices by incorporating the best available science and results from real-world activities. Under the ACE-led RCPP projects as mentioned above, Sandia National Lab will conduct biogeochemical modeling (an ensemble of three biogeochemical models: DAYCENT, Ecosys, and DeNitrification-DeComposition) from sampling farms within our 10-state, 167-county project area. The results from these models will then be aggregated to calculate the mean value and 95% confidence to quantify changes in crop productivity, soil organic carbon and GHG emissions due to adoption of different conservation management practices in the RCPP project area. The models will also be used to show individual farmers how changes in their management practices could improve soil and economic health. Findings from these assessments will be shared one-on-one in meetings between the project technical team and farmers. Ultimately, our goal is to empower the farmers and ethanol producers participating in our RCPP projects to use this data to qualify CI reductions in low carbon fuel markets, and we offer to share the results with your team to assist USDA in taking an iterative approach to making sure CI values reflect real-world activity. To the extent there are "data gaps," we are confident our RCPP projects can help solve for many of those needs.

Since every point of CI has value under clean fuel programs and tax credits such as 45Z, exclusion of any GHG reduction factor will result in an incomplete and inaccurate CI score and deny biofuel feedstock producers access to credits that reduce GHGs per unit of energy production while producing feedstocks. GREET's version of the FD-CIC currently accounts for most of the GHG feedstock production energy yields and emissions, including feedstock yield, biofuel yield of the feedstock, the amount and types of fuels and energy sources, fertilizers and lime, herbicides, insecticides, and soil GHG emissions (nitrous oxide and carbon dioxide emissions) resulting from the use of nitrogen fertilizers and lime.

Feedstock yield is of particular importance because it has such a significant impact on overall CI for biofuel feedstocks. It is imperative for USDA to ensure its version of the FD-CIC also accounts for all of these factors. Having said that, the GREET FD-CIC needs to be improved in certain areas. We will conclude our comments by outlining two such areas for improvement.

First, the GREET FD-CIC default assumes 100% fossil-fuels are used in farm machinery (tractors, sprayers, harvesters, and transport equipment). This does not reflect real-world activity. Many U.S. farmers use 20 to 100% blends of biodiesel in farm machinery and 15 to 85% ethanol blends in gasoline-powered vehicles and light-duty machinery. The accuracy of CI scoring could be greatly improved by reflecting this reality in the modeling. ACE has replicated the GREET model and included user inputs for farm use of renewable fuel blends in our online corn ethanol carbon intensity calculator.[8]

Second, the GREET default one-way transportation distance of 40 miles from farm storage to ethanol plants is outdated. A 2015 USDA study indicates the average one-way transportation distance from farm storage to ethanol plants is just 20 miles.[9] The outdated default distance reflects a time prior to the modern-day buildout of the ethanol industry to 200+ facilities. It should be updated.

Thank you for your time and consideration of these comments.

Sincerely,

[8] https://ethanol.org/detailed-carbon-calculator

[9] https://www.usda.gov/sites/default/files/documents/2015EnergyBalanceCornEthanol.pdf

Brian Jennings, CEO
American Coalition for Ethanol