Comments on Technical Guidelines for Climate-Smart Agriculture Crops Used as Biofuel Feedstocks

Docket No. USDA-2024-0003

Thank you for the opportunity to comment on *Technical Guidelines for Climate-Smart Agriculture Crops Used as Biofuel Feedstock*. We represent Verdova, Inc., a grower-focused agricultural data company that was founded by and is partially owned by U.S. farmers. We work with farmers who manage over 5 million acres, covering more than 22 states and 30 crop types. We have produced carbon intensity (CI) scores for 100+ growers, comprising 50M+ bushels of Corn and Sorghum and covering 200K+ acres across the Midwest, namely Illinois, Kansas, Minnesota, and South Dakota. Over 60% of these scores were completed using both GREET FD-CIC and USDA FD-CIC. Comparisons between GREET FD-CIC and USDA FD-CIC will form the basis of much of our comment.

We have comments pertaining the following.

1. Recordkeeping - We believe that it is adequate and feasible given the flexibility on record types.
2. Reduced Nitrogen Rate Implementation - We propose nitrogen use efficiency (NUE) as a metric to define a *reduced nitrogen application rate* climate-smart agriculture (CSA) practice.
3. Consideration of Manure Usage - We propose including manure's direct effects on reducing CI in USDA FD-CIC.
4. Clarification on § 2100.053.d - We are requesting clarification on the split in-season application standard.
5. Clarification on § 2100.053.b, § 2100.053.c - We are requesting clarification on when to count nitrogen from phosphorus fertilizers.
6. Clarification on § 2100.053.b, § 2100.053.c, § 2100.053.d - We are requesting clarification for cases where a product containing nitrogen is used for purposes other than fertilizing.
7. Relaxation of § 2100.053.b, § 2100.053.c, § 2100.053.d - We are proposing a relaxation of the nitrification inhibitor, no fall application, and split in-season standards.

The focus of these comments will be the lack of impact of fertilizer amounts, yield, and manure usage, along with ensuring that USDA FD-CIC can more closely account for growers' current practices, such that they stay engaged in the CI scoring process. Much of these data is already specified to be recorded, so we look to maximize the data within the current recordkeeping standard to better reflect a grower's greenhouse gas (GHG)-reducing practices.

Through our interaction with growers and presenting scores from both GREET FD-CIC and USDA FD-CIC, we've encountered surprise and disappointment from the lack of impact from yield and fertilizer usage. Those are key metrics for any grower and, to learn that they have no impact in the newer USDA FD-CIC, can cause disengagement from CI scoring process. Further, there are many growers who believe that they follow CSA standards, but may miss some portion of the relatively strict requirements, causing additional confusion and frustration with the CI scoring process. In the case of manure, it is not accounted for at all leading to further frustration.

Please see the following discussion of our seven points for additional details.

Sincerely,
Max Feinberg, CTO, Verdova, *max@verdova.com*
Steven Schlax, Head of Data Engineering, Verdova, *steven@verdova.com*
Alec Thompson, Data Engineer, Verdova, *alec@verdova.com*

1. Recordkeeping

We find that the record management and verification outlined in § 2100.051.c, § 2100.052.b, and § 2100.053.e to be adequate and consistent with the quantity and types of records growers keep and are able to produce. Through our scoring process, we obtain and retain records sufficient to fulfill § 2100.030, § 2100.031, and § 2100.040.a-b and find that the vast majority of growers are able to provide such records, thanks to the flexibility given to allowed forms of records.

2. Reduced Nitrogen Application Rate Implementation

In acknowledgment of *USDA Response and Request for Additional Public Comment* point 8, we propose using nitrogen use efficiency (NUE) as a metric to determine a *reduced nitrogen application rate* CSA practice, with the further consideration that it include only synthetic nitrogen sources. NUE could be used as follows:

1. Define a metric to evaluate a *reduced nitrogen application rate* CSA practice.
2. Recognize the GHG/bu reduction from growers who either (i) increase yield, or (ii) reduce (synthetic) nitrogen rate, and,
3. Depending on the consideration for manure, give another avenue for manure to have a GHG reduction, other than not being included for fertilizer timing-related N, pertaining to § 2100.053.b-d.

Consider the following representative corn fields using reduced till.

Field	Location	Fall Fertilizer	Spring Fertilizer	Yield	NUE
1	Champaign, IL	NH3 @ 150 lb N/ac	UAN32 @ 25 lb N/ac	250 bu/ac	0.7
2	Champaign, IL	NH3 @ 250 lb N/ac	None	200 bu/ac	1.25

Table 1: *Example of NUE for two different nutrient management practices.*

Without a CSA practice that considers NUE, these two fields would have the same reduction under USDA FD-CIC, as neither qualify for any fertilizer timing and otherwise share the same practices, even though Field 1 has significantly lower GHG. As GHG is considered on a per-bushel basis, we believe that there should be more consideration for farmers who reduce GHG by reducing N or increasing yield.

A consideration for NUE implementation is the effect of background soil N on feasible NUEs for a given field. We recognize that poorer soils will often struggle to hit any NUE threshold due to some combination of increased nutrient demand and lower yields. A possible remedy to that is via inclusion of manure, as outlined in Comment 3, either by indirectly reducing synthetic N (and ultimately NUE), or more directly having a larger direct GHG reduction on poorer soils, as per GREET FD-CIC. (See Table 2 below in Comment 3.) That gives growers in geographies with poor soil the opportunity to benefit from NUE.

With that in consideration, we propose the following.

> 1. *Use nitrogen use efficiency (NUE) as a metric to determine a “reduced nitrogen application rate” CSA practice.*
> 2. *Calculate NUE by the standard equation: N(synthetic, lbs) / Yield(bu) = NUE (on a per acre basis).*

The data needed and verification process are already covered in § 2100.053.e-f, so no additional recording standards would need to be developed.

Note that the above proposal suggests considering only synthetic N sources, in line with § 2100.053.b.1, § 2100.053.c.1-2, and § 2100.053.d.1. Including *all* N sources would still give benefit to some growers, but likely exclude those with poorer soils. In this case, it is also important to consider the possibility of "double counting" manure (i.e., it's used to reduce synthetic N and also used to directly reduce GHG). This consideration is discussed further in Comment 3.

3. Consideration of Manure Usage

In the current guidance, the only potential effect of manure is the reference to synthetic N consideration for fertilizer timing in § 2100.053.b-d. GREET FD-CIC included the soil organic carbon (SOC) effects of manure, which in some cases could be significant. That is especially true in areas with poor soil where growers may not as easily reach NUE or fertilizer-timing considerations due to differing nutrient needs. Consider the following example fields, using reduced till in Scott County, KS, and Champaign County, IL, tabulated below.

Field Location (practice)	**GREET FD-CIC (% difference)**	**USDA FD-CIC (% difference)**
Scott, KS (*with* manure)	– 41.7%	N/A
Champaign, IL (*with* manure)	– 11.1%	N/A
Scott, KS (*without* manure)	+ 1.4%	– 9.6%
Champaign, IL (*without* manure)	+ 1.4%	– 6.4%

Table 2: *Change from baseline from GREET or USDA default in percent for example fields in Scott County, KS and Champaign County, IL for both GREET FD-CIC and USDA FD-CIC. Recall that negative* (–) *is a reduction.* (*See Appendix 1 for calculations.*)

The lack of manure considered here is most impactful to a county with relatively poorer soil (i.e., Scott, KS). This follows the proposal of NUE as a metric to determine a *reduced nitrogen application rate* CSA practice, which growers in poor soil would also struggle to fulfill. Manure would be a good option for these grower to further reduce CI. The difference becomes even more stark if we consider the following representative fields.

Field	**Location**	**Fall Fertilizer**	**Spring Fertilizer**	**USDA GREET (% difference)**
1	Scott, KS	Manure @ 150 lb N/ac	UAN32 @ 25 lb N/ac	– 9.7%
2	Scott, KS	None	NH3 @ 175 lb N/ac inhibited	– 17.5%

Table 3: *Example Scott, KS, fields for two different fertilizer practices.*

Without manure consideration, the practice involving higher GHG/bu would be incentivized (i.e., Field 2). That could be partially accomplished if the NUE metric is used to implement a *reduced nitrogen application rate* CSA practice without including organic fertilizer sources as outlined in 2.3, in which case Field 1 would benefit from that CSA practice. While that would result in a marginal reduction, we believe that directly including manure would more accurately reflect its full impact.

With these points in consideration, we propose either of the following, or both.

> 1. *If "reduced nitrogen application rate" is included as a CSA, then exclude manure from the NUE calculation, and consider only synthetic N sources. That would enable a grower to more easily reach the required threshold. The "Nitrification inhibitor" (§ 2100.053.b.1), "No fall application" (§ 2100.053.c.1-2), and "Split in-season" (§ 2100.053.d.1) practices already make the synthetic/ organic delineation, so a similar split could be applied to "reduced nitrogen application rate."*
> 2. *Consider the SOC sequestration effect of manure, giving a direct reduction to baseline CI based on manure usage.*

If the possibility of "double counting" manure is a concern, because manure is used to both (i) reduce synthetic N (fulfilling the *reduced nitrogen application rate* CSA practice, as outlined in Comment 2) and (ii) directly reduce GHG, we believe that including the direct effects on GHG from SOC effects would help the growers who rely on manure for GHG reduction the most.

As stated in § 2100.053.a.1, manure records are already covered, so no additional recording standards would need to be developed.

4. Clarification on § 2100.053.d - Split In-Season Application Standards

In § 2100.053.d, the only reference to nutrient timing notes that "Farm Producer must apply at least 75 percent of total crop synthetic N needs after crop emergence." However, earlier in the document under "CSA Practice Standards: Implementation → Nutrient Management → Split In-Season Application Standards," it mentions a minimum of *two* applications, with the initial application at the time of planting. It is unclear whether "fall application of fertilizer" or "fertilizer application before planting" is allowed under this practice. We request clarification on allowed nitrogen applications for this practice.

5. Clarification on § 2100.053.b, § 2100.053.c - Nitrogen from Phosphorus Fertilizer

In § 2100.053.c.2, it specifies that N from phosphorus fertilizers is specifically included for the purposes of determining N timing. We request clarification on if N from phosphorus fertilizers is included in § 2100.053.b or § 2100.053.d. We note specifically that including N from phosphorus fertilizers for § 2100.053.b would disqualify the vast majority of growers who already use inhibitors with the rest of their fertilizer. A similar issue involves N from phosphorus fertilizers disqualifying the majority of growers who could otherwise qualify for *no fall application* CSA practice, though this is mentioned specifically in § 2100.053.c.2 so does not need clarification. The prevalence of this disqualification is expanded on in Comment 7.

6. Clarification on § 2100.053.b, § 2100.053.c, § 2100.053.d - Use of product containing N for purposes other than fertilizing

For the purpose of determining § 2100.053.b-d, if a product containing N is used for purposes other than fertilizing (eg. ammonium sulfate used as an adjuvant for a crop protection application), should that be included as synthetic N in determining fertilizer timing practice qualification? One possibility would be to not include it if the particular product is applied with a tank mix at a concentration of less than, for example, 5% by weight, with perhaps some consideration on total lb N/ac delivered.

7. Relaxation of § 2100.053.b, § 2100.053.c, § 2100.053.d - Nitrification inhibitor standards, No fall application standards, Split in-season application standards

We consider that § 2100.053.b, § 2100.053.c, and § 2100.053.d could have their requirements pertaining to nitrogen relaxed, and we further consider that only *some* proportion of nitrogen contributes, instead of *all* nitrogen. Taking a sample of 100K acres that have had both GREET FD-CIC and USDA FD-CIC assessments, we demonstrate the following implementations of the standards as an example.

1. Strict (as written): Standards are implemented as defined, with *split in-season* being considered a stricter subset of *spring-only* in that there should be no N fertilizer applications 30 days before planting (in addition to 75% of the N being applied after emergence). N from phosphorus fertilizer is considered included for all standards. (See Comment 5 above.)
2. Relaxed (as proposed herein):
   a. The *nitrification inhibitor* standard is considered only if 75% or more of the total applied N is applied with an inhibitor. For example, if 150 lbs N out of total 200 lbs N applied have an inhibitor (i.e., 75%), then the *nitrification inhibitor* standard would apply.
   b. *Spring-only* and *Split in-season* have N from phosphorus fertilizers excluded.

When applied to a selection of acres from Kansas and Illinois, the following data are generated.

Application Details	Strict (% of bushels that qualify)	Relaxed (% of bushels that qualify)
Nitrification Inhibitor	1.9%	44.6%
Spring Only	4.0%	18.9%
Split In-Season	0.2%	1.8%

Table 4: *Percent of bushels following a given standard based on "strict" and "relaxed" metrics from a ~100k acre dataset covering Illinois and Kansas.*

As is seen in the above table, with existing crop management practices, the strict standards are very difficult to meet. Further, with their relatively low impact, there may be an issue with grower motivation to switch to a strict standard. We can also look at the net scores in a relaxed and strict setting, as compared to GREET FD-CIC.

	Source	Change From Baseline CI
1	GREET FD-CIC	– 8.4%
2	USDA FD-CIC (strict)	– 9.3%
3	USDA FD-CIC (relaxed)	– 13.0%

Table 5: *Reduction from baseline CI for ~100k acre dataset covering Illinois and Kansas.*

From these data, despite the lack of qualification for fertilizer timing for the majority of bushels, the strict USDA FD-CIC matches more closely with the GREET FD-CIC (i.e., rows 1 and 2). That is also despite the fact that GREET FD-CIC takes into account fertilizer amounts and types and manure while USDA FD-CIC does not. That suggests that USDA FD-CIC is relegating more growers to the default practice (i.e., no GHG reduction practice), creating a higher barrier to entry for any GHG-reduction activity. That could cause a lack of incentive to adopt any CSA practices if current, less strict reductions are not recognized.

With that in consideration, we propose the following.

> 1. *Relax § 2100.053.b, such that some fraction of applied N (but not all N) has an inhibitor. For example, if a particular threshold is considered (e.g., 75%), then if 150 lbs of N out of 200 lbs of N applied has an inhibitor, the nitrification inhibitor standard would apply.*
> 2. *Relax § 2100.053.c-d, such that nitrogen from phosphorus fertilizers are excluded.*

With relaxing these standards, we recognize that the USDA FD-CIC scores will diverge further from the GREET FD-CIC CI score. The goal of this proposal is to *increase* the number of growers who can participate in these CSA practices, which could be offset by, for example, increasing the baseline CI score in the case of no CSA practices. In USDA FD-CIC, the default CI, which indicates *conventional till* (CT), is often more in-line with GREET FD-CIC considering *reduced till* (RT). Consider the following example corn fields that demonstrate this idea.

Field	GREET FD-CIC CT	GREET FD-CIC RT	USDA FD-CIC CT
Scott, KS	7659	6383 (-16.7% wrt GREET FD-CIC CT)	6295 (-17.8% wrt GREET FD-CIC CT)
Champaign, IL	6983	6383 (-8.6% wrt GREET FD-CIC CT)	6295 (-9.9% wrt GREET FD-CIC CT)

Table 6: *Example Carbon Intensity (CI) values* (*in g GHG/ bu*) *for fields in Illinois and Kansas for conventional and reduced tillage with no other CSA practice*.

Table 6 illustrates a significant implicit reduction in USDA FD-CIC outcome (i.e., ≥ 500 point reduction) for growers who did not partake in any CSA practice (i.e., CT). This is because the delta between GREET FD-CIC CT and GREET FD-CIC RT is very similar to the delta between GREET FD-CIC CT and USDA FD-CIC CT even though in one case it is a CSA practice compared to a non-CSA practice (RT vs CT), and the other case is a non-CSA practice compared to a

non-CSA practice (CT vs CT). There could be room here to increase the baseline CI for no CSA practice and give more flexibility for growers to qualify for the aforementioned CSA practices. This would reduce the delta between the USDA FD-CIC CT score and the GREET FD-CIC CT score lessening the implicit reduction that all growers are receiving. This would ultimately allow relaxation of the above fertilizer timing CSA practices while maintaining an overall reduction in CI from baseline consistent with GREET FD-CIC and USDA FD-CIC (strict) outlined in Table 5.

APPENDIX

1. FD-CIC reference = 6295 gGHG/bu (from USDA FD-CIC)

   Scott, KS GREET FD-CIC
   Reduced Till, no manure = 6383 gGHG/bu = + 1.4%
   Reduced Till, manure = 3672 gGHG/bu = – 41.7%

   Scott, KS USDA FD-CIC
   Reduced till, no manure = 5693 gGHG/bu = – 9.6%
   Reduced till, manure = N/A

   Champaign, IL GREET FD-CIC
   Reduced Till, no manure = 6383 gGHG/bu = + 1.4%
   Reduced Till, manure = 5594 gGHG/bu = – 11.1%

   Champaign, IL USDA FD-CIC
   Reduced till, no manure = 5891 gGHG/bu = – 6.4%
   Reduced till, manure = N/A