A greenhouse gas offset methodology for *Grazing Land and Livestock Management* (GLLM) was developed by Winrock International, with financial support from the David & Lucile Packard Foundation and technical input from a GLLM Technical Advisory Committee composed of:

- Shawn Archibeque, Colorado State University
- Richard Conant, Colorado State University
- Gustavo Cruz, UC Davis
- David Diaz, The Climate Trust
- Alan Franzluebbers, USDA – Agricultural Research Service
- Stephen De Gryze, Terra Global Capital
- Karen Haugen Kozyra, Prasino Group / BIGGS project
- Ermias Kebreab, UC Davis
- April Leytem, USDA – Agricultural Research Service
- Arvin Mosier, USDA – Agricultural Research Service (ret'd)
- Matt Sutton-Vermeulen, Prasino Group / BIGGS Project
- Juan Tricarico, Dairy Management Institute

The GLLM methodology was posted for public comment from December 20, 2012 – January 31, 2013. A stakeholder consultation webinar was held January 22, 2013 and questions and answers from that webinar are also included below. Public comments and responses by the authors are documented separately. The draft methodology, revised in response to public comments, was been provided to a team of five peer reviewers, experts in the fields of grazing land management, livestock management in the beef and dairy sectors, and GHG accounting. Peer review comments and responses are summarized below.

In this review, the following formatting is followed:

1) Text in italics is original text from the ACR documents without alterations

2) Text that is not italics but includes words highlighted in yellow, is text that has been modified. The modified text has been highlighted.

## 1. GENERAL

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 1-1 | 2.2 | You use the term "focal" emissions, but never define what this means. Please provide a definition either here or in a glossary. | "Focal" was intended as a general term to refer to the particular emission source being evaluated *ex ante* – i.e., enteric, manure, fertilizer, fossil fuel, or biotic sequestration. For example, for enteric, "estimated emission reductions from focal sources are less than 5,000 tCO$_2$-e annually" would mean if estimated enteric emissions are less than 5,000 tCO$_2$-e annually, the calculations in A-MICROSCALE may be used for enteric emissions.<br><br>Added definition of Focal Source: the source being evaluated when emission impacts are estimated using T-XANTE in the A-MICROSCALE module. Focal sources include enteric, manure, fertilizer, and fossil fuel emissions, or biotic sequestration. | Accepted | n/a | OK |
| 1-2 | | For every case where Monte Carlo (MC) simulation is required, the protocol should clearly specify what sources of uncertainty should be considered and how to obtain estimates of the magnitude of the sources of variation. The use of MC is just to combine known sources of variation in complicated (or simple) manner. But MC does not "create" the uncertainty. | We agree MC does not create uncertainty. It is a tool to allow uncertainties to be combined. Specification of MC is merely saying the IPCC Tier 1 approach of propagation of errors is unacceptable. We have been as specific as we reasonably can, however, keeping options open for choice of models necessarily prevents us from being specific in terms of what input parameters are involved. The MC approach is required and it will be up to the VVB to ensure correct application. | I am just trying to help avoid misuse of the methodology. The document should specify rules or at least guidelines indicating what sources of uncertainty must be incorporated and how those uncertainties are to be estimated and even integrated in the MC simulation. These rules would not limit the choice of models or methods to estimate components of uncertainty.<br><br>Looking at the issue from the other side, if the idea is not to limit the options, why specify that MC has to be used? Why not simply state that a valid method for error | I feel there is some misunderstanding here. I think what we are saying is that an IPCC Tier 1 approach of propagation of errors is unacceptable. We look for a higher tier method. The IPCC specifies Monte Carlo, and so do we.<br><br>We can't require certain sources of uncertainty because we do not know the input values to the models without specifying the | OK (the precision and confidence interval defined will address the uncertainties reasonably well, which means that higher tier is to be achieved). |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|------------|----------|-------|
| | | | | propagations and integration should be used and let the VVB ensure correct application?<br><br>In summary, the requirement of MC gives a false impression of methodological sophistication. This requirement can be met simply by using it to calculate a confidence interval for a mean instead of using the usual formula with the t distribution. | model. | |
| 1-3 | | Was the T-XANTE module provided? | Yes. T-XANTE is simply a tab within the A-MICROSCALE spreadsheet. It provides an *ex ante* estimate of the magnitude of impacts in each focal source, based on the simplified accounting methods in the other tabs. | Accepted | n/a | OK |
| 1-4 | | GWPs<br><br>$GWP_{CH4}$ has been revised to 25 for the second commitment period of Kyoto Protocol. Probably it would be better to use this value.<br><br>$GWP_{N2O}$ has been revised to 298 for second commitment period of Kyoto Protocol. Probably it would be better to use this value.<br><br>Please check in all modules | Per the *ACR Standard*, the IPCC Second Assessment Report 100-year GWP values have been retained. ACR recognizes IPCC has updated the GWP numbers, but ACR and virtually all other carbon offset program (and the EPA national inventory) have stayed with the 2nd Assessment Report values despite these updates, for consistency of emission inventories and fungibility of credits issued across years. | Accepted | n/a | OK |
| 1-5 | | Related to the 'Grazing Land and Livestock Management (GLM) Methodology' document | In this case ACR has decided not to define a list of eligible GLLM activities in the methodology, since the potential activities (in dairy and beef production | Examples would be very helpful. I think I read in other section that work was being done towards generating complete | The list of examples has now been added as footnote #2 in FRAMEWORK-GLLM. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | ' …the methodology is applicable to beef and dairy production worldwide'. The document refers almost entirely on production systems in the USA. Some examples of how the methodology could be applied to specific, prominent production systems would be beneficial [e.g., for dairy: free-stall confinement, tie-stall confinement, intensive rotational grazing, hybrid confinement-grazing, mixed dairy-beef systems (prominent production system types in sub-Saharan Africa]. Could some examples be given in Appendices? | systems around the world) are many and are better designed by the Project Proponents/livestock producers than by ACR. Instead, any activity that affects one of the five target GHGs (enteric, manure, fertilizer, fossil fuel, and biotic sequestration) is eligible as long as it correctly applies the modules and respects the accounting thresholds in 2.1.<br><br>We have, for other purposes, developed non-exhaustive lists of eligible GLLM practices, such as the list below. But we have intentionally not included these in the methodology, lest they be interpreted as the only eligible activities.<br><br>• Implement rotational and management intensive grazing in beef and dairy<br>• Dietary changes<br>• Monensin or other feed additives to suppress enteric methane<br>• Reduce fertilizer and natural gas emissions embedded in feed<br>• Change manure management system<br>• Tree planting (silvopasture)<br>• Fertilize or irrigate pasture<br>• Convert cropland to pasture | examples. I support that. | | |
| 1-6 | | 'Methodologies to create marketable GHG offset credits that could improve incentives for producers to adopt mitigation practices'. Are there any lessons learned from international arenas in the area of economics of | There are certainly such lessons learned, but these would not be included in a methodology. The summary document being commented on here is just a background document, not part of the methodology. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | investments vs. return in offset? | | | | |
| 1-7 | | The methodology focuses on five primary GHG sources, sinks and reservoirs (SSRs) affected by livestock production. Not clear what the difference between sinks and reservoirs. | GHG Sources, Sinks and Reservoirs (SSRs) are terms used in the ISO 14064 series of standards. There, GHG source is defined as "a physical unit or process that releases a GHG into the atmosphere"; a GHG sink is "a physical unit or process that removes a GHG from the atmosphere"; and a GHG reservoir is "physical unit or component of the biosphere, geosphere or hydrosphere with the capability to store or accumulate a GHG removed from the atmosphere by a greenhouse gas sink or a GHG captured from a greenhouse gas source."<br><br>With respect to this methodology, enteric, manure, fertilizer and fossil fuel are all GHG sources whose emissions may be reduced through GLLM project activities. Biotic sequestration refers to enhancing the capability of GHG reservoirs (also sometimes referred to as "carbon pools," e.g. soil carbon, belowground biomass, aboveground biomass) to function as more effective GHG sinks. We believe ISO may have intended to draw a distinction between the reservoir (as a stock at a particular point in time) and the sink (as a process or flow).<br><br>We agree that the distinction between sinks and reservoirs is a minor one. However since the distinction between sinks and reservoirs has no practical implications in the methodology, we have retained the ISO wording. | It sounds like the ISO definitions are poor. The document should try to avoid poor definitions. Although the poor definition seems to have no effect here, its use propagates and supports the definition. | The ISO terminology may be poor but is used in most GHG methodologies, so we have retained it. | OK,<br><br>(will be useful to clarify in the framework document as to which definitions follow ISO terminology and all other remaining ones not explicitly defined follow the definitions of ACR Standard) |
| 1-8 | | The project seeks to create awareness and adoption of | ACR is currently compiling data from livestock producers in Maryland, Arkansas, California and | I do not understand the relationship between the comment and the response. | Agreed. We only meant to highlight, in response to the | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | practices that will reduce GHG. The methodologies offer very good first-steps, based on current sound scientific understanding. Framework algorithms could be easily amended as implementation is monitored and evaluated. | other locations to test the methodology. These and the results of future pilot tests may be used to modify the methodology and release updated versions, as needed, over time. | The comment does not seem to require a response. | comment that the methodology offers very good first steps and could be amended, that there is a process for ACR to update the methodology in the future (e.g. later to release version 2.0) and our pilot-testing will help inform improvements over time. | |
| 1-9 | | It is not clear how 'hotspots' would be accounted for. Many livestock operations have outside areas where cattle congregate and spend considerable time. A large proportion of total manure can be deposited in and uncollected from these areas. | The methodology, like the DAIRY GEM model used in creating A-MANURE, does not allow for pasture areas where manure accumulates in potentially anaerobic conditions. | I recognize 'hotspots' are not covered by DairyGEM. Is there a way to include something in the methodology that brings attention to possible 'hotspots' in pasture-based systems? That operators of these systems may wish to consider separate treatment of 'hotspots', if they exist. We have found that 30-60% of annual manure may be deposited on 10-20% of the non-pasture land base (travel lanes, shaded and watering areas, etc).<br><br>Concentration of manure in reduced areas is a natural and common result of livestock behavior. My guess is that there is an implicit assumption that there is a discrete change from completely dispersed to completely concentrated feces. Even in extensive grazing systems it is possible to have concentration of manure, but typically this is not anaerobic. | We acknowledge manure hotspots are an issue, and one insufficiently addressed in DairyGEM, but we feel it is beyond the scope of this methodology to propose a better accounting method. | OK<br><br>( a note to could be inserted in methodology that this issue is not covered by methodology and project entities can request revision to methodology to incorporate the issue) |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 1-10 | | Uncertainty. It would be useful to state briefly somewhere why uncertainty needs to be calculated by the user. I understand why this is important to estimate outcomes, but I would think this uncertainty should be calculated and factored into the overall design of GLLM project. Also, uncertainty calculations should not change from 'baseline' to 'with-project' because same model and parameters need to be used for both scenarios. | In most GHG methodologies, the uncertainty in GHG calculations (if any) must be calculated and deducted from credits awarded in order to maintain the principle of conservativeness.<br><br>Uncertainty is calculated individually in each of the large-scale accounting modules. | Accepted | n/a | OK |
| 1-11 | | Improve clarity of writing | We have endeavored to improve clarity throughout. | Keep up the good work! | n/a | OK |
| 1-12 | | Maintain absolute consistency in use of technical terms | We did a check and believe technical terms are now used consistently and that all technical terms are now defined in section 3.0, Definitions, unless they are defined in the *ACR Standard.* If the reviewers notice particular terms that are not defined or are used inconsistently, please bring this to our attention in the 2nd review and we will correct. | Accepted | n/a | OK |
| 1-13 | | The whole protocols should be applied to a real or simulated project to see how it performs and to spot potential deficiencies. | ACR is currently compiling data from livestock producers in Maryland, Arkansas, California and other locations to test the methodology. These and the results of future pilot tests may be used to modify the methodology and release updated versions, as needed, over time. | Accepted | n/a | OK |

## 2. FRAMEWORK-GLLM

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 2-1 | Applic. Conditions | • *The methodology is applicable to any GLLM project activity implemented on a beef or dairy livestock operation.*<br><br>Unless GLMM project activities are defined independently and outside this document, this reference is circular. | In this case ACR has decided not to define a list of eligible GLLM activities in the methodology, since the potential activities are many and are better designed by the Project Proponents/livestock producers than by ACR. Instead, any activity that affects one of the five target GHGs (enteric, manure, fertilizer, fossil fuel, and biotic sequestration) is eligible as long as it correctly applies the modules and respects the accounting thresholds in 2.1.<br><br>We have, for other purposes, developed non-exhaustive lists of eligible GLLM practices, such as the list below. But we have intentionally not included this list in the methodology, lest they be interpreted as the only eligible activities.<br><br>• Implement rotational and management intensive grazing in beef and dairy<br>• Dietary changes<br>• Monensin or other feed additives to suppress enteric methane<br>• Reduce fertilizer and natural gas emissions embedded in feed<br>• Change manure management system<br>• Tree planting (silvopasture)<br>• Fertilize or irrigate pasture<br>• Convert cropland to pasture | I do not think the response applies to the comment. I was just referring to the fact that the methodology states that it applies to something defined in the methodology. This can be resolved simply stating what the methodology applies to without using a term defined within the methodology. | Understood. A non-exhaustive list of eligible activities has now been added as footnote #2 in FRAMEWORK-GLLM. | OK |
| 2-2 | Applic. Conditions | Putting grazing animals on forest land causes forest degradation and over time inevitably deforestation. Should forest lands be excluded completely? | We do not agree that livestock and trees cannot in some cases coexist; for example, in some Western U.S. lands that are actively grazed, there are enough trees to pass the 10% forest cover threshold so that the lands formally constitute | Silvopastoral systems should be allowed. I support the response and recommend that | Silvopastoral systems are indeed allowed. See the new footnote #2 in FRAMEWORK-GLLM. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | If not the consider rewording<br><br>• <mark>If the project lands prior to project implementation have sufficient forest cover to be defined as 'forest,' trees present in the baseline may not be felled in site preparation or during project implementation.</mark> | 'forest,' but produce sufficient forage for cattle and are viewed as and managed as grazing lands.<br><br>However we understand the reviewers' concern that putting cattle on forest lands can cause deforestation, and not through any action of the project proponent (which the third applicability condition addresses by saying trees present in the baseline may not be felled in site preparation or during project implementation).<br><br>We do not see any difference between the proposed wording and the current wording of this applicability condition except for the addition of "prior to project implementation." This is consistent with our intent and the proposed revised wording has been adopted. | forested lands not be excluded a priori. | Enhanced biotic sequestration in trees would be quantified, per the applicable threshold, in A-MICROSCALE, A-SMALLSCALE, or A-BIOTIC. | |
| 2-3 | Applic. Conditions | Consider rewording<br><br>• <mark>In the project scenario, project lands must be managed for grazing/livestock.</mark><br><br>Reasoning<br><br>Leakage is assessed anyway. If the exclusion is due to the potential for leakage and leakage is ruled out, it could be argued that the reason for the exclusion no longer applies. | We understand the reviewers' perspective that since leakage must be assessed and deducted, in theory it could be allowed to change the land use away from grazing/livestock and simply account for the activity shifting and market effects leakage caused by a 100% reduction in product output. However, leakage accounting methods are at best imperfect, such that we do not think they should be relied upon for such a dramatic change in output. The goal here is to minimize the risk of leakage, and then provide tools to account for leakage that happens if product output modestly declines. We do not want to allow in land-use change in which the project lands would entirely stop producing beef and dairy products. | Accepted | n/a | OK |
| 2-4 | Applic. Conditions | Consider rewording<br><br>• GLLM activities in which livestock <mark>graze on public lands during all or part</mark> | Accepted the first suggested rewording. On the second, clarified wording to read: "… documentation from the responsible public agency that the agency **cedes ownership of any resulting offset credits** to the Project | | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | of the year may only receive credit for enhanced biotic sequestration if the Project Proponent provides documentation from the responsible public agency that the agency cedes offset ownership these credits to the Project Proponent. In addition, projects claiming credit for biotic sequestration on public lands must make their non-permanence buffer contribution in non-project ERTs. | Proponent." | | | |
| 2-5 | Applic. Conditions | Consider rewording<br><br>• Recognizing that some grazing land is leased rather than owned, the Project Proponent need not necessarily demonstrate land ownership, but must demonstrate offset title and effective control over the GHG sources and sinks from which the credited reductions/removal enhancements originate, for the duration of the specified Minimum Project Term. The landowner must sign a letter of agreement granting offset title to the Project Proponent and guaranteeing no change in land-use for the duration of the Minimum Project Term. | Revised wording: "**The Project Proponent must provide a letter of agreement from the landowner**, granting offset title to the Project Proponent and guaranteeing no change in land-use for the duration of the Minimum Project Term."<br><br>To clarify that not only must the landowner sign this letter, but the Project Proponent has to provide it to ACR and the validation/verification body. | Accepted | n/a | OK |
| 2-6 | Applic. Conditions | Consider rewording<br><br>• Projects on organic soils are eligible if the models used in the relevant | Rewording accepted. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | <mark>modules allow for the estimation of emissions on these soils</mark> | | | | |
| 2-7 | Applic. Conditions | Typo<br><br>• Aggregated projects and Programs of Activities (PoAs) must comply with the definitions in <mark>section</mark> 3.0 and the rules in Annex A. | Correction made. | Accepted | n/a | OK |
| 2-8 | Applic. Conditions | • *The FRAMEWORK module shall be used regardless of the magnitude of emissions or removals estimated ex ante.*<br><br>This statement seems confusing. Consider clarifying your intentions. | The intention here was to make clear that while some modules are optional – e.g. A-SMALLSCALE only has to be used if *ex ante* estimated emissions in a particular source exceed 5,000 tCO$_2$-e per year; A-ENTERIC only has to be used if *ex ante* estimated enteric emissions exceed 60,000 tCO$_2$-e per year, etc. – the FRAMEWORK module is always required. All projects regardless which GHG sources/sinks they affect, and regardless of the magnitude of their *ex ante* estimated impacts on those sources/sinks, use the FRAMEWORK module. | Accepted | n/a | OK |
| 2-9 | Applic. Conditions | • *If project activities lead to a decrease greater than 3% in product output, relative to the baseline case, the potential for activity shifting and market-effects leakage emissions must be accounted for using the L-GLLM module.*<br><br>Comments:<br><br>1) For consistency, the threshold for significance needs to be consistent with other definitions on significance adopted under the ACR Standard. | On comment 1), we believe the 3% is consistent with the *ACR Standard*, at least as regards how significance is treated in the decision to include/exclude GHG SSRs from the project boundary. The *ACR Standard* states that "If exclusion of a pool or source is not conservative, Project Proponents may apply a significance tool to determine whether the pool or source may be considered insignificant. Insignificant pools and sources may be excluded if all combined pools and sources thus excluded represent less than 3% of the *ex ante* calculation of emission reductions/removal enhancements" (*ACR Standard* Chapter 2.D).<br><br>On comment 2), we do not see how a Project Proponent | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | 2) The applicability condition needs to state that if the product output is significantly different from the baseline, then it needs to be demonstrated that decline is not related to market effects using criteria related to market leakage. This way burden of leakage assessment could be mitigated. | can demonstrate that a decline in product output is not related to market effects. In fact, this seems somewhat backwards: if there is a decline in product output, caused by the project activity, this may be the cause (not the consequence) of market effects leakage, which then has to be estimated in L-GLLM.<br><br>We also do not feel the market effects leakage assessment in L-GLLM is overly burdensome, since it is based on elasticities of supply and demand, for which default values are provided, at least for projects in the U.S. This makes market effects leakage assessment quite straightforward. (It is true that projects outside the U.S. must derive their own elasticity values.) | | | |
| 2-10 | Applic. Conditions | • *Change by the Project Proponent to the drainage conditions on project lands are not permitted in any instance in which such changes would significantly increase emissions of greenhouse gases.*<br><br>Comment: How to assess that drainage conditions are altered by PP. This may be difficult unless certain criteria are specified, which can be checked by the verifying auditor at the time of verification. | The intent of this applicability condition was to prevent changes in drainage conditions such as diversion of water flows, construction of drainage ditches or dikes, flooding of areas previously not flooded, etc. We feel these are substantive changes in drainage that should be very apparent to VVBs, allowing the VVB to assess whether the applicability condition has been met.<br><br>We have added those examples to the applicability condition to improve clarity. | Accepted | n/a | OK |
| 2-11 | General | It would be useful to include summary statements about the biophysical relationships and processes that influence GHGs from GLLM systems. These statements could also include expected magnitude of change over common, current practices. | We agree this would be useful but not that it should be included in a methodology. A methodology in our view should provide only the necessary guidance, eligibility criteria, and accounting methods to calculate GHG reductions creditable to a project activity – not supporting information or estimates of expected magnitude of | OK. This will be partly addressed by the quantitative examples that apparently will be supplied in the future. | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | change. Such information is extremely useful, and indeed necessary for different audiences -- livestock producers, regulatory agencies, etc. – and ACR is working to compile this information, but does not intend to include it in the methodology. | | | |
| 2-12 | General | It would be useful to either have a glossary of terms and/or footnote terms that are not commonly used. For example (1) In the section 'Applicability Conditions', at the end of the 4th bullet point: '…leakage concerns…' is mentioned. Likewise, the 7th bullet point has …market-effects leakage emissions' (2) Pg 5, under A-MANURE and elsewhere: '…from focal sources' local? Also, it is not clear the difference between sinks and reservoirs. | We have defined in FRAMEWORK-GLLM, section 3.0, terms used in this GLLM methodology that are not defined in the *ACR Standard*. More general terms defined in the *ACR Standard* (baseline, leakage, additionality, etc.) are not repeated in methodologies, since the *ACR Standard* is a governing document standing over all methodologies. We conducted another scan to make sure any terms that are not defined either place and are not obvious in their meaning are included in section 3.0, Definitions.<br><br>On the difference between sinks and reservoirs, see response to comment 1-7 above. | Accepted | n/a | OK |
| 2-13 | General | Overall, I found the writing to be unnecessarily complicated. I made many suggestions for changes, but the whole document must be revised to make easy to read and understand. | Thanks for the suggestions, many of which we have incorporated. | Accepted | n/a | OK |
| 2-14 | General | These could be written more directly and clearly. For example:<br><br>Instead of<br><br>• *To provide applicability conditions for the methodology overall*<br><br>• *To provide guidance under which conditions to use the other modules*<br><br>One could write | The current wording was retained from other modular methodologies Winrock has written, but we agree the suggested wording is just as good and have revised accordingly. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | • To define the conditions under which the GLLM methodology and each module are applicable | | | | |
| 2-15 | Purpose | ERT has not been defined in this document. Consider rewording.<br><br>• To calculate emission reduction tonnes (ERTs) using the output parameters of the other modules | Emission Reduction Tonnes (ERTs) are simply the ACR crediting unit and are defined in the *ACR Standard*:<br><br>The "ERT" is the ACR unit of exchange for tradable, project-based carbon offsets. ACR issues one ERT for each metric ton of $CO_2e$ emission reductions or removals verified against an ACR standard and methodology. ERTs issued to a project equal the project's Net Emission Reductions minus the offsets set aside in the ACR buffer pool (unless the Project Proponent elects to contribute other ERTs to the buffer pool, or to use a different ACR-approved risk mitigation mechanism).<br><br>Definitions included in the *ACR Standard* are not repeated in methodologies, to keep the methodologies as brief as possible and because the *ACR Standard* is a governing document standing overall methodologies.<br><br>However, we adopted your suggestion to spell out Emission Reduction Tonnes (ERTs) in the Purpose section. | I meant that the acronym had not been "defined" by spelling it out the first time the term is used.<br><br>OK<br><br>Strive for a balance between not repeating definitions and having a readable document. Even if terms have been previously defined by Winrock or ISO, one cannot assume that the reader will use the correct definition based in the context. Many entities have define the same terms in a variety of ways. A citation of the document containing the desired definitions should suffice to avoid ambiguity. | Thank you. The first sentence in 3.0 Definitions states that:<br><br>Where not explicitly defined in this document, current *ACR Standard* definitions apply.<br><br>So if the user does not find a definition in the list, e.g. for a more general ACR term that is not specific to this GLLM methodology, they can go to the *ACR Standard.* We think this is sufficiently clear. | OK |
| 2-16 | 1.0 | *The methodology focuses on five primary GHG sources, sinks and reservoirs (SSRs): enteric* | Yes. Correction made. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | *methane, manure methane, nitrous oxide from fertilizer use,….'* .<br><br>Shouldn't manure also include nitrous oxide? | | | | |
| 2-17 | 1.0 | Why is it restricted to beef and dairy. Why exclude the potential for vegetation management using grazing with sheep and goats, for example? | We felt it was important to restrict the methodology to cattle (though remain unrestricted on eligible practices) because of the need to understand enteric and manure emissions that are specifically associated with cattle. We did not have appropriate data or quantification methods for such emissions from other livestock. The methodology may be expanded to other livestock in the future. | Accepted | n/a | OK |
| 2-18 | 1.0 | Consider rewording<br><br>The methodology is designed to ensure the complete, consistent, transparent, accurate and conservative quantification of GHG emission reductions and sequestration associated with a GLLM project. | Correction made. | Accepted | n/a | OK |
| 2-19 | 1.0 | *The methodology is designed to ensure the complete, consistent, transparent, accurate and conservative quantification of GHG emission reductions associated with a GLLM project. The methodology also aims to provide flexible and cost-effective accounting methods where it can be shown that anticipated impacts on a particular SSR are small; see section 2.1.*<br><br>In the applicability conditions refer to aggregated projects and PoAs, better to reflect this in the text as well. | We believe this is somewhat redundant, since aggregated projects and PoAs are mentioned in the applicability conditions, but we have added the following sentence to the end of section 1.0:<br><br>"The methodology is also designed for application to multiple project instances, fields, producers combined into a single Aggregate or Cohort in a Program of Activities; see the definitions in section 3.0 and the rules in Annex A." | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 2-20 | 2.1 | A decision tree may be a useful diagram to include | Excellent suggestion. A decision tree has been added to the FRAMEWORK-GLLM module section 2.1. | Accepted | n/a | OK |
| 2-21 | 2.1 | *For SSRs where the project activity is expected to cause 'micro' impacts (less than 5,000 tCO2-e per year), the simplified accounting tools provided in A-MICROSCALE are all that is required to account for emission reductions/removal enhancements in that SSR.*<br><br>Comments:  Microscale threshold of 5000 t CO2 may not be cost effective to implement. Is this adopted from ACR rules or is it specific to this framework? In the context of CDM is 20,000. It is better increase the threshold of micro scale. For example, CDM uses a microscale threshold of 20,000 t CO2. I suggest that you consider increasing your threshold. | We appreciate the suggestion. However the 5,000 $tCO_2e$/year threshold is for specific sources (enteric, manure, fertilizer, fossil fuel, or biotic sequestration), not for the project's impacts overall. We think moving the threshold to 20,000 $tCO_2e$/year for each source could allow very large impacts to be accounted for using the simplified, Tier 1 methods in A-MICROSCALE, which is not consistent with the methodology authors' intent in creating accounting flexibility.<br><br>We think most projects will have their primary impacts on one or two sources. They would have to use A-SMALLSCALE or the larger-scale accounting modules for those sources, but could still use A-MICROSCALE for other sources where impacts are <5,000 $tCO_2e$/year. We think this strikes the right balance between providing flexibility and maintaining rigor in accounting for the overall impacts of the GLLM project. | Accepted | n/a | OK |
| 2-22 | 2.1 | *For projects outside the continental United States, for SSRs where the project activity is expected to cause impacts greater than 5,000 $tCO_2$-e per year, the large-scale modules A-ENTERIC, A-MANURE, A-FERTILIZER, and A-BIOTIC must be used.*<br><br>Comment. This may increase the burden for entities with small operations in other countries. Therefore, the uptake of methodology may be limited. Increasing the | It is correct that because of the absence of something like COMET-FARM with worldwide scope, projects outside the U.S. will be required to use the large-scale modules for GHG impacts exceeding the 5,000 $tCO_2e$ microscale threshold. However, the methods in those large-scale modules are reasonable. We do not anticipate a lot of small-scale projects in least developed countries using this methodology; a more likely scenario is very large projects, in which case they would be required to use the large-scale modules anyway. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | microscale threshold may ease such burden as well. Another reason to increase the threshold. | At present ACR is not comfortable with allowing projects outside the U.S. to have a higher threshold to use the simplified accounting methods in A-MICROSCALE. | | | |
| 2-23 | 2.1 | *For fossil fuel emissions, for all projects in the continental United States A-SMALLSCALE shall be used; for all other locations A-MICROSCALE shall be used.*<br><br>Comment: Why not have common module for emissions such as fossil fuels as this will reduce complexity of the methodology without sacrificing the environmental integrity. | An earlier draft of this methodology had an A-FOSSIL FUEL module. This was dropped because a) COMET, the basis of A-SMALLSCALE, provided superior estimates of fossil fuel emissions for projects in the U.S., and b) we decided the methods in A-MICROSCALE, which are based on IPCC defaults, were adequate for projects elsewhere – rather than burdening them with a more complex A-FOSSIL FUEL module. | Accepted | n/a | OK |
| 2-24 | 2.2 | Was the T-XANTE module provided? | Yes. T-XANTE is simply a tab within the A-MICROSCALE spreadsheet. | Accepted | n/a | OK |
| 2-25 | 2.2 | The calculation tool should be provided in alternative open source and free software. | Is this comment referring to A-MICROSCALE? A-MICROSCALE is simply an Excel spreadsheet; it involves no programming that is not transparent by viewing the formulas in the cells. | I mean that it requires that people buy Excel. It would be simple to offer an Open Office alternative. The same goes for any type of statistical and GIS software and files for this and other projects. There are industrial-quality alternatives that are free. | Agreed, but since Excel is fairly common as part of the Microsoft Office suite, and the authors have limited time to explore or develop open-source alternatives, we have stayed with Excel for this methodology version. | OK |
| 2-26 | 2.2 | Accounting Modules<br><br>There are lots of sub-categories noted here, | We appreciate the suggestion of a decision tree and have now included this in FRAMEWORK-GLLM section 2.1. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | better to consolidate them and present in the form of a flow chart/ table or decision tree. There is a significant need for consolidation of thresholds and geographic US and non-US applicability to avoid multiple scenarios that could increase transaction costs. | We have not consolidated the accounting thresholds for U.S./non-U.S., since with some of the accounting tools this is simply not feasible (e.g. the COMET-FARM tool used in A-SMALLSCALE has been developed with U.S. Department of Agriculture support and only covers the U.S.). | | | |
| 2-27 | 2.2 | • *A-MICROSCALE: an Excel spreadsheet-based tool calculating baseline and project emissions from GLLM activities inside or outside the United States, using IPCC emission factors and other methods. Used for all emission sources and carbon pools when estimated emission reductions from focal sources are less than 5,000 t CO$_2$-e annually. A-MICROSCALE is also used for calculation of fossil fuel emissions for all projects outside the continental United States.*<br><br>Comments:<br><br>1) Better to increase the limit to 20,000 t CO2 in line with the CDM microscale.<br><br>2) This could be common for both US and non-US cases. | See responses to 2-21, 2-22 and 2-26. | Accepted | n/a | OK |
| 2-28 | 2.2 | Tools<br><br>It is not clear how T-XANTE spread sheet is to be used by the project. Does it mean use of default values will avoid the need for monitoring? What will the verifying auditor check when T-XANTE tool is used? | T-XANTE is a tab in the A-MICROSCALE spreadsheet. It uses default values for calculations, but the methodology does not anywhere suggest monitoring is not required for projects (or sources within projects) falling under the microscale threshold. Monitoring requirements are stipulated in FRAMEWORK-GLLM section 8.0, and are not | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | dependent on scale. | | | |
| | | | "… when T-XANTE is used": T-XANTE is not really used for crediting. It merely provides an *ex ante* estimate of impacts in each of the five sources/pools, which the Project Proponent uses to determine whether they base their calculations on A-MICROSCALE, A-SMALLSCALE, or the full-scale modules. | | | |
| | | | However, interpreting your question as "What will the verifying auditor check when A-MICROSCALE tool is used?": We expect the VVB would conduct spot checks of the data put into A-MICROSCALE (acres, number of animals, feeding regime, etc. – basically anything entered into the light blue cells) to ensure this is without errors and an accurate representation of the Project Proponent's facilities, as well as ensuring that the data outputs from A-MICROSCALE are used properly in calculating ERTs per section 7.0 of the FRAMEWORK. The VVB would also be checking that applicability conditions are met, monitoring was done per requirements, leakage assessment if required, and so on. | | | |
| 2-29 | 3.0 | The following text is confusing because "activity" is not defined. Consider rewording<br><br>***Aggregate:*** *the grouping of multiple project instances, fields, producers or facilities into a single project activity registered on ACR.* | "Project activity" here meant the project registered on ACR. We have dropped the word "activity" and simply use "project" throughout the modules. | Good. This may have been the point of confusion in 2.21. The review was assuming that project activity was all actions in a project (in which case 5,000 t is small). However, you clarify this to say that a project can be made up | Yes, a project may be made up of multiple activities. We have used "project" throughout. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | of multiple activities.<br><br>Please check for consistency | | |
| 2-30 | 3.0 | Consider rewording<br><br>**Project Participant:** a legal entity participating in an Aggregate, or in a Cohort of a PoA.<br><br>Are corporations, farmer associations, etc. not allowed? | Corporations and farmer associations would be legal entities as long as somehow formally constituted. Do the reviewers suggest different wording?<br><br>The goal here is to ensure that there is at least one party that can serve as Project Proponent, with legal status sufficient to hold an account on ACR. | You've missed the point. The text says "producer" and not legal entity. This means that a group of producers (i.e. a farmer association) is not a project participant. | Now we understand. We have changed the definition of Project Participant to use "legal entity" as suggested by the reviewer. | OK |
| 2-31 | 3.0 | Please clarify "reference region"<br><br>Does this mean that reference regions must be defined using political boundaries? Reference regions should be defined for each practice. Adoption rates probably depend a lot more on geology, geography, topography and climate than on political boundaries, but political boundaries will work if they have finer grain than the biotic and abiotic conditions. | In this methodology Reference Regions are only used for the purposes of evaluating current adoption rates of GLLM practices in order to allow crediting to early adopters (if current adoption rates of the practice adopted by an early adopter remain under 5% in the Reference Region). Thus it was necessary to define Reference Region. We considered three potential approaches, , summarized below with advantages (+) and disadvantages (-):<br><br>• State boundaries: (-) often not correlated with climate or soils, which may drive management practices, (+) statistics may be available at the state level from NASS, ERS, or extension services<br><br>• USDA Major Land Resource Area (MLRA): (-) may be too large to be useful for livestock projects, (+) follows natural soil and climate boundaries<br><br>• Boundaries based on concentration of livestock practices. (-) requires extra work to delineate areas, (+) most accurate in terms of livestock | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | regions | | | |
| | | | We ultimately decided that for GLLM projects in the U.S., state boundaries although imperfect would be the most feasible and unambiguous considering data availability for determining adoption rates. We then specified that GLLM projects in other countries should define Reference Region based on similar jurisdictions, i.e. states or provinces. | | | |
| | | | We agree with the reviewers' contention that adoption rates vary more based on geology, geography, topography and climate (and other factors affecting livestock management) than on political boundaries, but because most data is collected and/or aggregated at the state level, we think this is the pragmatic approach. | | | |
| 2-32 | 4.1 | Define "facility" | "Facility" is used in its general, plain-English sense in this methodology, e.g. a feedyard, dairy milking barn, etc. could be a facility. We do not want to create a potentially limiting definition of "facility" that could inadvertently exclude some operations, so we prefer to leave this undefined. | Accepted | n/a | OK |
| 2-33 | 4.1 | Consider rewording <br><br> The GLLM project activity may also span several entities | Please clarify -- is the suggestion here merely to drop the word "commercial" (which would be fine; we are not meaning to exclude any entities) or that the entire sentence is unclear? The sentence gives examples of the sorts of "entities" meant: cow-calf, backgrounding and feedyards, and specifies that the project geographic boundary shall include all entities over which the Project Proponent has effective control. We have dropped "commercial." | As I stated in my comments, "These are not commercial entities but types of production activities." The comment highlighted the examples of commercial entities given. The examples given are not commercial entities but | Both commercial entities and types of production that are not commercially constituted could theoretically enter into a project. We have revised the sentence in question to read: <br><br> The GLLM project may | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | types of livestock production: cow-calf, backgrounding, feedyards. A commercial entity is a person or organization that can legally enter into a contract, and may therefore be sued for failure to comply with the terms of the contract: persons, corporations, LLC's etc.<br><br>I suggest that the text be changed to reflect whatever is meant, type of production or commercial entity. Consider that a project can span both several commercial entities and types of production simultaneously. | also span several entities and types of livestock production (e.g. cow-calf, back grounding and feed yards). | |
| 2-34 | 4.1 | Clarify<br><br>*The geographic boundary shall be defined to include all entities over which the Project Proponent has effective control.*<br><br>Reason: The proponent may be a third party (e.g. aggregator) for whom this requirement makes no sense. This requirement has to be | We agree the Project Proponent may be a carbon project developer, not the livestock producer him/herself, so the Project Proponent will not have ownership or management control over the entities included in the project. ACR only needs to be sure the Project Proponent has unique title and control over the GHG reductions being claimed, which may be secured through an agreement with the livestock producer granting the Project Proponent exclusive title to | This requirement continues to be problematic for me. Imagine a project proponent that owns land that it uses for tomatoes in California and land used for a | The intent was not to require unrelated lands (like the tomato producing lands in California in this example) to be included in the project geographic boundary. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | defined more clearly. The definition can be borrowed from other protocols. | the emission reductions.<br><br>The wording has been revised: "The geographic boundary shall be defined to include all entities over which the Project Proponent (or the livestock producer(s) with whom the Project Proponent has contractual agreements to implement the project) has effective control." | GLLM in Brazil. It appears that the geographic boundary would include the land in California, even if that operation is completely unrelated to the GLLM. | We have added the following sentence:<br><br>"The geographic boundary shall however exclude lands and entities controlled by the Project Proponent that are unrelated to the GLLM project and not subject to shifting of livestock to these areas as a result of the GLLM project." | |
| 2-35 | 4.1 | Clarify and expand<br><br>*Defining the geographic boundary of the GLLM project activity may require creating analytical units that correspond more to animal management than specific areas of land, e.g. in the case where animals are held on different lands at different times of the year or different parts of their life cycle. The Project Proponent must justify to ACR and the VVB the logic of the geographic boundary definition based on how animals under the Project Proponent's control are managed across the year and through their life cycle.*<br><br>This is absolutely critical and I surmise that the protocol should be stricter than what is presented here. The overall efficiency and performance of a grazing + system can pivot | We agree and what the reviewer suggests was the intent of the paragraph quoted here: i.e. to recognize that during their lifecycle, livestock may be held at different locations and the Project Proponent should not be allowed to exclude from the project boundary some lands or facilities where livestock are held for person of the year or parts of their lifecycle.<br><br>We have added, immediately after the paragraph quoted:<br><br>"All lands and facilities where animals are fed/grazed and/or spend time during the year or during their life cycle shall be included within the project boundary." | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | on a short period and small piece of land. All lands and facilities where animals are fed/grazed and/or spend more than 3-4 days should be within the boundary or should be carefully accounted for in terms of net impact. | | | | |
| 2-36 | 4.1 | *Note that the GHG boundary, however, may be broader, requiring the project proponent to consider GHG emissions attributable to "upstream" activities such as feed production, fossil fuel and fertilizer use (see section 4.3).*<br><br>Comment: This is likely to be difficult and confusing. | We agree that accounting for upstream activities may be challenging. Section 4.3 however provides full details on which GHG sources must be accounted vs. may be excluded from accounting because emissions in these sources are negligibly small or conservative to exclude. It also specifies that emissions associated with feed production (one of the main upstream activities) must be included and accounted for in both baseline and project, so that any significant increases in emissions from feed production due to the project can be accounted for as project emissions. This is necessary for completeness and conservativeness. However it also allows decreases in upstream emissions from feed production to be credited to the project, provided the Project Proponent can demonstrate there will not be any double counting or double claiming of these reductions. Decreases in upstream emissions may always be ignored (not claimed as credits) if the added cost for accounting for these emissions exceeds the potential revenue from claiming them. | Accepted | n/a | OK |
| 2-37 | 4.2 | Minimum Project Term:<br><br>*Projects claiming reduced emissions that are irreversible…*<br><br>Consider rewording: Should this be reversible? For example, reversion to former, | No, the current wording is correct. "Reversible" here does not refer to reversion to a former livestock management practice; rather, to the potential for reductions/sequestration that have already occurred and been issued credits to be "reversed" through the re-emission of GHGs to the atmosphere. This risk only applies | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | high GHG emitting diets would 'reverse' mitigation. | to carbon offset projects increasing sequestration: e.g., a forest carbon project in which credits are issued for increases in carbon sequestered that could be later re-emitted in a fire. Such projects are required by ACR to adhere to a Minimum Project Term and to make a buffer contribution, depositing some percentage of credits at each issuance into a shared buffer account from which ACR retires credits, in the event of a reversal, to compensate for the loss. | | | |
| | | | The GHG reductions achieved when enteric, manure, fertilizer, and fossil fuel emissions are reduced or avoided cannot subsequently be reversed. Reverting to a former, higher-GHG diet would mean that those GHG reductions are not achieved going forward, but it would not reverse the GHG reductions achieved while the lower-GHG diet was in place. | | | |
| | | | In this methodology, projects reducing enteric, manure, fertilizer, and fossil fuel emissions have no reversal (or "impermanence") risk and so do not require a Minimum Project Term. Only projects enhancing biotic carbon sequestration have a reversal risk and so require a Minimum Project Term and a buffer withholding percentage as indicated in section 7.0, equation (1). | | | |
| 2-38 | 4.2 | Rewording<br><br>This will need to be defined in the GHG Project Plan such that there is a discrete identifiable date when the project activities began to diverge from baseline management. | Rewording accepted. | Accepted | n/a | OK |
| 2-39 | 4.2 | *For example, for a GLLM project instituting rotational grazing where the baseline was* | The example does seem consistent to us, since preparatory activities prior to the installation of fences will not cause | I may be missing something, but the | We now understand. We think the emissions | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | *continuous pasture, the Start Date may be the start of the first grazing season in which fences are installed and cattle are managed in rotation.*<br><br>This specific example does not seem appropriate, because it gives the impression that all preparatory activities leading to the installation of the fences are ignored. | emissions to diverge from the baseline scenario. Only once the fences are installed and cattle formerly managed on a large pasture are now managed rotationally, would project emissions begin to diverge from the baseline.<br><br>If the reviewers recommend, we could remove all three examples from the paragraph on Start Date, since they are only examples and not exhaustive. But we think they could be useful in helping the Project Proponent to identify the Start Date, even for GLLM practices not mentioned here. | project may include building of fences to be able to implement rotational grazing. In such case, all emissions related to preparation for and building the fences are clearly a consequence of the project. For example: fencing materials may be purchased, transported and stocked several months before the start of fencing. It would analogous to soil preparation activities prior to planting a forest in a reforestation project. I do not understand why those emissions would be ignored in GLLM's. | from transporting fences are very likely *de minimis*, but we have revised the wording of the example:<br><br>"For example, for a GLLM project instituting rotational grazing where the baseline was continuous pasture, the Start Date may be the start of the first grazing season in which fences are procured for installation and subsequent management of cattle in rotation." | |
| 2-40 | 4.2 | *For a GLLM project continuing grazing but implementing silvopasture, the Start Date would be the date of tree planting.*<br><br>Same comment as above. This implies that all tillage, herbicide etc. prior to the planting are ignored. I would say that the project starts as soon as the enterprise starts managing | Here we agree and the text should say for projects implementing silvopasture, the Start Date would be the date of site preparation for tree planting. This correction has been made.<br><br>Again, we could drop all three Start Date examples, but we don't want to require (or allow) the Project Proponent to specify a Start Date that is months or years before project | I am not referring to "some sort of planning activities." A commercial entity can do a lot prior to the fencing to "hide" or not account for emissions | This is an interesting example and not something we want to allow the Project Proponent to "hide." We have revised the text to read: | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | anything as a part of the project and towards the project goals, with reasonable exclusions based on the potential GHG impacts of project activities that take place during early project activities. | emissions actually began to diverge from baseline emissions, simply because some sort of planning activities began at that time. | that are in reality clearly determined by the grazing project. Consider an entity that cuts the trees in a woodland two years prior to starting fencing for a GLLM. The cutting is specifically done to provide the wood for the fences, allowing time for wood to cure and to be milled. Just the production of fence posts could be a little carbon project on its own. It is not clear to my how this would be accounted for if the GLLM project does not start until the animals start the new grazing method. | "For a GLLM project continuing grazing but implementing silvopasture, the Start Date would be the date of site preparation for tree planting, or the date when pre-existing trees are cut prior to fencing."<br><br>And, because what is in this paragraph is only examples and we cannot provide Start Dates for all conceivable eligible GLLM activities, we have added at the end of the same paragraph:<br><br>"The Project Proponent must justify the Start Date to ACR and the VVB, and may not set the Start Date after activities that are clearly linked to or preparatory to the GLLM project and have a greater than *de minimis* impact on GHG emissions or carbon pools in the project | |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | | | boundary." |
| 2-41 | 4.2 | Expand and elaborate on "Crediting Period" and "Project Term"<br><br>What is the relationship between "project term" and "crediting period?" | These terms are defined in the *ACR Standard*:<br><br>Crediting Period is the finite length of time for which a GHG Project Plan is valid, and during which a project can generate offsets against its baseline scenario. The baseline must be re-evaluated in order to renew the Crediting Period.<br><br>Minimum Project Term is the minimum length of time for which a Project Proponent commits to project continuance, monitoring and verification.<br><br>Whereas Crediting Period is the length of baseline validity, and is specified differently in different methodologies depending on the length of time for which the baseline for a given activity can be considered valid before it should be re-evaluated, Minimum Project Term is the overall length of commitment by the Project Proponent and is related to the risk of reversals.<br><br>Here, all GLLM projects that only impact enteric, manure, fertilizer, and fossil fuel emissions (i.e. non-reversible emission reductions), the Crediting Period (baseline validity period) is 10 years and there is no Minimum Project Term. Such projects must re-evaluate their baseline at 10 years in order to renew for another Crediting Period. For GLLM projects impacting biotic sequestration only, or for the biotic sequestration component of GLLM activities impacting multiple SSRs, the Crediting Period is 40 years and the Minimum Project Term is also 40 years. | Accepted | n/a | OK |
| 2-42 | 4.2 | *A PoA will have multiple different Crediting Periods: a Crediting Period for the first Cohort* | ACR unlike CDM does not limit the number of Crediting Period renewals – but does require, at each Crediting | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | *(the Cohort included in the GHG Project Plan at the time of establishment of the PoA), and Crediting Periods for each new Cohort. See Annex A.*<br><br>Comment: The maximum crediting period for a PoA under CDM is 28 years. How to assess if some project practices have become part of the baseline especially in cases some cohorts complete one or more 10 year crediting periods and they may not be considered additional. | Period renewal (*ACR Standard* chapter 6.G):<br><br>• Re-submitting the GHG Project Plan in compliance with then-current ACR standards and criteria;<br>• Re-evaluating the project baseline;<br>• Demonstrating additionality against then-current regulations, common practice and implementation barriers (or against an approved performance standard and then-current regulations);<br>• Using ACR-approved baseline methods, emission factors, tools and methodologies in effect at the time of Crediting Period renewal;<br>• Undergoing validation and verification, as required.<br><br>Because we require reassessment of the baseline and additionality at each renewal, we feel it is not necessary to limit the number of renewals. Practices that have become common and are no longer additional to business-as-usual or surplus to regulations will not qualify for Crediting Period renewal. | | | |
| 2-43 | 4.2 | *Projects claiming reduced emissions that are irreversible – e.g. reduced enteric, manure, fertilizer, and fossil fuel emissions – have no Minimum Project Term requirement. Thus the 40-year requirement only applies to projects seeking credit for enhanced biotic sequestration.*<br><br>Comment: There may be a need for additional guidance on the renewal of crediting periods for cohorts under PoA. | Cohorts in a PoA will have different Start Dates and (10- or 40-year) Crediting Periods. Cohorts in a PoA for an activity that targets only reduced enteric, manure, fertilizer, and fossil fuel emissions (no biotic sequestration enhancement) could renew for enough 10-year periods that eventually they last more than 40 years, but at no point would they have a Minimum Project Term or penalty for discontinuing. Cohorts in a PoA for an activity that targets biotic sequestration enhancement have both a 40-year Crediting Period and a 40-year Minimum Project Term.<br><br>In either case, Crediting Periods and Minimum Project | Is it correct to assume that cohorts that target both emissions (enteric, manure, fertilizer, and fossil fuel emissions) and enhanced sequestration have larger of the two terms (i.e. 40 years)? In such a case, it will be also relevant to clarify as to | See section 4.2 of FRAMEWORK-GLLM, where we have added the following clarification:<br><br>"Projects that target enhanced biotic sequestration only will have a Crediting Period of 40 years and Minimum Project Term | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | Terms would be tracked on a rolling basis, based on the Start Date for each Cohort. Could the reviewers provide an indication where they see the need for additional guidance? | how the renewal of crediting period for emissions at 10 year intervals is implemented. | of 40 years. Projects that target enhanced biotic sequestration but also reductions in enteric, manure, fertilizer, or fossil fuel emissions will have a 40-year Crediting Period and 40-year Minimum Project Term for the enhanced biotic sequestration component of the Project, but a 10-year Crediting Period and no Minimum Project Term for the emission reductions components of the Project. Projects that target emission reductions only and do not claim credit for enhanced biotic sequestration will have a 10-year Crediting Period and no Minimum Project Term." | |
| 2-44 | 4.3 | Table 1 Considering that de minimis rule is applied. There is no need for specifying that fossil fuel emissions to be accounted in case of | The *ACR Standard* states that "If exclusion of a pool or source is not conservative, Project Proponents may apply a significance tool to determine whether the pool or source may be considered insignificant. Insignificant pools and | Yes, it will be better to clarify that projects falling within microscale thresholds should be | To make this clear we have added after Table 1: "Emissions listed as | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | microscale/small scale activities as noted in section 2.1 | sources may be excluded if all combined pools and sources thus excluded represent less than 3% of the *ex ante* calculation of emission reductions/removal enhancements" (Chapter 2.D).<br><br>It seems like fossil fuel emissions could exceed 3% of the *ex ante* calculation of emission reductions/removal enhancements, and thus the Project Proponent would not be allowed to exclude them from accounting, but still fall under the 5,000 tCO$_2$e/year threshold for microscale impacts and thus the Project Proponent would want to avail themselves of the simplified accounting methods in A-MICROSCALE. Are we misunderstanding the comment? | able to use simplified procedures approved in the microscale module. | "Included" in Table 1 shall be quantified per the thresholds given in section 2.1 of this module."<br><br>And after Table 2:<br><br>"Enhancements in sequestration in the pools listed as "Included" in Table 2 shall be quantified per the thresholds given in section 2.1 of this module."<br><br>This will require the GHG sources and pools listed as "Included" to be accounted for, but will allow Projects whose impacts on those sources/pools fall under the specified micro-scale and small-scale thresholds to use those accounting modules as specified in section 2.1 of FRAMEWORK-GLLM. | |
| 2-45 | 4.3 | *Emission decreases related to feed production (lower emissions from feed production in the project than in the baseline scenario) may be* | We are not sure it is necessary to have this as an applicability condition, since it is clear in 4.3, but we have nonetheless added it: | Thank you. | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | *credited to the project if the feed is grown on lands owned or controlled by the Project Proponent or Project Participant. For example, shifting from grains grown on own lands to greater pasturing of livestock, reducing the amount of grain produced, may result in a decrease in fertilizer and fossil fuel emissions on project lands that is creditable.* | "Emission decreases related to livestock feed production may be creditable under this methodology provided the Project Proponent demonstrates those emission decreases are not claimed by others. See section 4.3." | | | |
| | | *Emission decreases related to feed production (lower emissions from feed production in the project than in the baseline scenario), when feed is not grown on lands owned or controlled by the Project Proponent or Project Participant, will only be credited to the project if the Project Proponent can demonstrate to ACR and the VVB that the producers of feed, fertilizer etc. will not claim credit to the same emission reductions (which would constitute double counting). For example, decreases in fertilizer use by the feed producer when a project imports less feed, or decreases in natural gas use when a project uses less DDGs, will be credited to the project but only if the above condition is met.* | | | | |
| | | Comment: It may be relevant to include this as an applicability condition of the framework so that efficient feed production activities that have low GHG emissions could be explicitly recognized in the application of the methodology. | | | | |
| 2-46 | 5.0 | The methodologies evaluate GHG reductions | We are unclear on the meaning of this comment. What is | <mark>This box was left blank</mark> | | OK (better |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | against benchmarks. It is not entirely clear how 'with-project' targets are set. How would the targets relate to the levels of output predicted by the equations. These algorithms are based on a certain range of input:output relationships. It would be useful to be more explicit about feasible range of outcomes. | meant by "with-project targets" and how these relate to the levels of output predicted by the equations? If this is in reference to the *ex ante* estimates of GHG reductions calculated in T-XANTE, we emphasize these are only estimates; crediting is based on *ex post* calculations of GHG reductions actually achieved.<br><br>If we have entirely missed the intent of this comment, please clarify it in the 2nd review and we will attempt to answer. | <mark>in the 2nd round review. Is it Accepted?</mark> | | to accept as this item seems to be minor relevance) |
| 2-47 | 5.0 | Reorganize this section<br><br>1) Start Date<br><br>2) Activities deemed additional a priori<br><br>3) Activities not apriori additional<br><br>  a. Regulatory surplus<br><br>  b. Not common practice<br><br>  c. Implementation barrier<br><br>4) Early adopters | Recommended reorganization adopted:<br><br>5.0 Demonstration of Additionality<br><br>5.1 Start Date<br><br>5.2 Activities Deemed Additional *a priori*<br><br>5.3 Activities Not *a priori* Additional<br><br>  5.3.1 Regulatory Surplus<br><br>  5.3.2 Not Common Practice and Faces Implementation Barrier(s)<br><br>5.4 Early Adopters | Accepted | n/a | OK |
| 2-48 | 5.2 | Mandate demonstration of regulatory surplus, not the manner in which it is achieved.<br><br>Remove the sentence<br><br>*The Project Proponent shall conduct a review of applicable regulations (e.g. air quality, water quality, water discharge, nutrient management, endangered species and protection, etc.), mandates, legal rulings,* | We disagree on removing the examples of applicable regulations, since these will often apply to and may mandate certain actions at livestock operations. Listing them provides guidance to the Project Proponent what they need to evaluate and to the Validation/ Verification Body what they need to verify.<br><br>We also disagree on the second deletion/ rewording, thinking it is better to be clear that the Project Proponent | The sentence is not written as providing guidance but as a mandate. It states that in every case all of those things MUST be done. At least, change the "shall" to something more in line with the | We elect not to change. We do want to require the Project Proponent to review all applicable regulations. Those in parentheses (air quality, water quality, etc.) are examples and if there is no air quality regulation | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | *consent decrees etc. that affect the project facilities or lands.*<br><br>Reword<br><br>~~In determining whether an action is surplus to regulations, the Project Proponent should not consider~~ Voluntary agreements without an enforcement mechanism, proposed laws or regulations, optional guidelines, or general government policies may qualify as regulatory surplus. | and VVB need not review such voluntary agreements, proposed laws, optional guidelines or general policies, as these will not mandate a specific project activity. Naturally if a voluntary agreement later becomes mandatory, or if a proposed law or regulation becomes an enacted law or regulation, the project may not qualify as regulatory surplus at the next interval of Crediting Period renewal and would not be allowed to renew. | concept of "guidance" you seem to defend. | that is applicable to the project activity, the Project Proponent proceeds to other regulations. | |
| 2-49 | 5.2 | Projects that are deemed regulatory surplus at the start date are considered surplus for the duration of the Crediting Period. | Insertion made. | Accepted | n/a | OK |
| 2-50 | 5.3 | This section is confusing. Please expand and clarify | The section "Practices Deemed Additional" (now moved to 5.2 Activities Deemed Additional *a priori* per the suggestion of the reviewers) was meant as a sort of placeholder, to indicate that ACR accepts in principle that practices which can be shown to have a very low adoption rate ought to be able to be included on a "positive list" (or *a priori* list) so that no demonstration of regulatory surplus, common practice or implementation barriers is required for these practices. However, at the time of methodology writing we did not have sufficient data on any GLLM practice to show that it was at less than 5% adoption within a defined region. So as of now this is basically an empty *a priori* list. We wanted to include the placeholder for an *a priori* list, and give Project Proponents the option to submit data demonstrating that a practice is at less than 5% adoption within a defined region, so that ACR could evaluate that data and if acceptable, add this practice in | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | the specified region to the *a priori* list. Over time, as additional projects are developed, the *a priori* list would grow, making additionality demonstration easier for future Project Proponents. <br><br> This is the explanation, but does not seem appropriate to include in the methodology itself. | | | |
| 2-51 | 5.3 | *Project Proponents may submit data to ACR indicating a particular practice within a specified region has an adoption rate lower than 5%. ACR will evaluate the submitted data and supporting documentation and consider adding the activity to the positive list of practices deemed additional. Adoption rate data will need to be re-evaluated at every baseline renewal.* <br><br> Comment: Does it also include the expert opinion on baseline and common practice listed in section 5.5 under early adopters as a basis for identifying the positive lists. | Yes. Text added to 5.2 Activities Deemed Additional *a priori*: <br><br> "Adoption rates demonstrated through the mechanisms in section 5.4 (survey data, expert opinion, and using adoption rates from already registered GLLM projects) may also be used as the basis for adding GLLM practices in specified Reference Regions to the *a priori* list of practices deemed additional." | Accepted | n/a | OK |
| 2-52 | 5.5 | Minimum data required. Given the size of some states it is possible that a region in a neighboring state has management more similar to a producer than others in their own state. For example, Eastern Washington is more similar to the Idaho Panhandle than it is to Western Washington and the same is true for the Idaho Panhandle. Cannot flexibility occur in the reference region as long as it is documented? | See response to comment 2-31: ACR recognizes that state boundaries are imperfect to define Reference Regions, and less influential on livestock management practices than geography, topography, climate, etc. However we chose state boundaries due to the likely greater availability of data on adoption rates within states, than within MLRAs or livestock management regions. <br><br> However, the reviewer's examples are good and the point is well taken. So we have added the following footnote to the definition of Reference Region in section 3.0: | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | "It is generally expected that data on baseline adoption rates will be more readily available at the level of states and provinces, than at the level of regions crossing political boundaries that may have similar common practice livestock management. If the Project Proponent is able to present data on baseline adoption rates, acceptable to ACR and the validation/verification body, for a Reference Region at the level of some political unit or ecological region other than state/province, this Reference Region may be accepted by ACR on a case-by-case basis." | | | |
| 2-53 | 5.5 | Reviewer A: Discussion of adoption (early adopters, adoption rates, incentives to transfer adoption (early adopter incentives) is clear, very useful and good.<br><br>Reviewer B: The section on early adopters requires significant attention.<br><br>With reference to Early Adopters, I think there will be difficulty in obtaining survey data and or expert opinion without some more specifics in the text. For example, what constitutes a valid survey? Can a reference be added to assist in designing or identifying a "statistically valid survey"? Shouldn't an expert have some data as a foundation for their expert opinion? Perhaps that is in the credentials section. | This section (now 5.4) gives three options to determine adoption rates of practices: surveys conducted by the project proponent, expert opinion, and using adoption rates from validated published GHG Project Plans.<br><br>The survey option states "Adoption must be determined using a statistically valid survey of producers within the Reference Region where the project is located." We think statistical methods for surveys are well enough understood by validation/verification bodies (VVBs) that it is not necessary to provide further information in the methodology in order for VVBs to assess whether the survey methods were statistically valid.<br><br>It is true that the expert opinion option relies on the credentials of the experts. It also relies on a significant built-in buffer -- only if 3 independent experts all agree the adoption rate of a given practice is less than 2% in the Reference Region (not 5%), is a Project Proponent not required to conduct their own survey. | Accepted | n/a | OK |
| 2-54 | 5.5 | This section is confusing. I think this subsection can be significantly improved by | The section has been significantly edited to remove | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | tightening the writing and reorganization. As it stands, the relationship between early adopter and additionality is tenuous, whereas it should be central and plain. | unnecessary information and repetition. | | | |
| 2-55 | 5.5 | *However, since many agricultural/livestock management decisions are made year-to-year, the argument of no environmental improvement does not necessarily hold, and disqualifying early adopters may create a perverse incentive for them to discontinue low-emission practices for one or more years in order to be able to re-start those practices and claim carbon credits.*<br><br>Comment: This is not a viable scenario, and such potential perverse consequences can be avoided much more simply than by the early adopter program. For example, one can simply disqualify such perverse producer explicitly and up front. | Theoretically it is true there would be other ways to avoid perverse incentives. In practice it could become difficult to determine why producers who adopted a practice during some years, but not all or not the most recent years, made these decisions. Did they stop because they wanted to "reset" their baseline and claim credit for resuming the same practice, or did they stop because weather conditions or input prices in some years made the practice unattractive, and they genuinely would only resume the practice now due to the incentive provided by carbon revenues? It becomes difficult and subjective to guess at motivation, so it seems simpler to create a mechanism that specifically addresses early adopter crediting.<br><br>In addition, ACR has heard the argument again and again that the early adopters of innovative practices tend to be the same producers seen by many in the agriculture and livestock sectors as the industry leaders, whose experience with carbon markets (positive or negative) is most likely to influence the views of other producers about participating. Creating a way to conservatively credit such producers could be the most effective mechanism to expand adoption by others; not crediting these producers ("penalizing early action" is the phrase usually used, though we recognize there is a difference between penalizing and not rewarding) may be the most effective way to guarantee other producers will not be interested. If agricultural GHG methodologies disqualify the most | Our opinions differ. OK. | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | innovative and progressive producers from receiving credit, the argument runs, why should others even consider participating? We can see both sides of this argument, but since our goal is both to reward the industry leaders and to reach the rest of the industry, we have decided it makes sense to provide a mechanism for early adopter crediting that is conservative and balances environmental integrity with the desire to see agricultural GHG mitigation practices adopted at scale. | | | |
| 2-56 | 5.5 | *The project's Crediting Period for such practices may be renewed only until the baseline adoption reaches 50%.* What is the meaning of "baseline adoption"? | We agree the use of "baseline adoption rate" throughout this section was confusing, since it was not used in the same sense as "baseline" is used in this methodology – rather meaning current adoption rates at the time the survey is conducted or expert opinion is sought. We have dropped "baseline" and now just use "adoption rate" throughout the section. | Accepted | n/a | OK |
| 2-57 | 5.5 | **Minimum data requirements for determining adoption rate.** The baseline adoption rate must be quantified in the Reference Region where the project is located. ~~Due to concerns of data availability on adoption rates, Reference Regions are here defined as the U.S. State (or similar jurisdiction, i.e. state or province, in other countries).~~ Comment: A reference region should not be defined again. However, the definition and use of reference region need to be improved in section 3.0 | Agreed it is not necessary to repeat the definition. We have deleted the definition from 5.4, and in the Definitions section 3.0, Reference Regions are still defined as states or provinces, but additional flexibility is provided through the footnote: " It is generally expected that data on adoption rates will be more readily available at the level of states and provinces, than at the level of regions crossing political boundaries that may have similar common practice livestock management. If the Project Proponent is able to present data on adoption rates, acceptable to ACR and the validation/verification body, for a Reference Region at the level of some political unit or ecological region other than | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | state/province, this Reference Region may be accepted by ACR on a case-by-case basis." | | | |
| 2-58 | 5.5 | **Survey data.** *The baseline adoption must be determined using a statistically valid survey of producers within the Reference Region where the project is located.*<br><br>Who determines what is a statistically valid survey?<br><br>*For initial validation, 1 data point in the past 5 years suffices to quantify the baseline adoption rate.*<br><br>This is confusing, please clarify | On statistically valid surveys, see response to 2-49. We think statistical methods are well enough understood by validation/verification bodies (VVBs) that it is not necessary to provide further information in the methodology in order for VVBs to assess whether survey methods were statistically valid.<br><br>The goal of the "1 data point in the past 5 years" provision was to recognize that, whether using new survey data or adoption rates published in validated GHG Project Plans, a Project Proponent may initially only have adoption rate data for one year out of the past five. However in order to renew the Crediting Period, adoption rates have to be based on at least two time points. | Accepted | n/a | OK |
| 2-59 | 5.5 | **Expert opinion.** *If 3 independent experts assert that the baseline adoption rate of a given practice is less than 2% of the acres or animal population within the reference region, no survey is required, and projects using the practice may use a common practice baseline.*<br><br>This has to be defined more clearly and taking into account that full adoption of certain technologies may involve less than 2% of the land. | What we meant here was expert opinion whether a practice is adopted on less than 2% of the acres devoted to production of the relevant beef/dairy cattle type in the Reference Region – not 2% of all the acres in the Reference Region – since as you say, adoption of a certain practice on 100% of the cattle-producing acres could still be less than 2% of the total acres in the Reference Region. We have attempted to clarify this by writing:<br><br>"… experts assert that the adoption rate of a given practice is less than 2% of the animal population, or 2% of the acres devoted to production of the relevant cattle type, within the Reference Region, no survey is required…"<br><br>We added the same language elsewhere in this section, when referring to the general 5% threshold, e.g.: | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | | "A Project Proponent who implements a GLLM practice that can be demonstrated to have an adoption rate less than or equal to 5% of the animal population, or 5% of the acres devoted to production of the relevant cattle type, within the Reference Region is deemed additional and can use a baseline that is based on the common practice of the producers who have not adopted the practice…" | | | |
| 2-60 | 5.5 | *It also fails to reward early action, and is often seen by others in the industry as a reason not to adopt the practices either (since those who are seen as the "industry leaders" cannot benefit).* <br><br> Comment: The provisions on the start date in section 5.1 may contradict the early adoption provision if the projects are expected to demonstrate the GHG incentive to be a factor for initiating a project during early adoption stage vs. early adopters are as industry leaders and risk takers noted here. | The sentence quoted here has been deleted, as part of editing section 5.4 for wordiness, but your point remains. It is true that the 5.1 language on Start Date (GHG mitigation as an original project objective) could exclude some early adopters who are unable to produce such documentation, and whom section 5.4 would allow. However, some early adopters may have sufficient documentation of GHG mitigation (among other) objectives to meet the 5.1 requirement. <br><br> We could consider deleting 5.1, such that Project Proponents with a Start Date more than a year prior to submission of the GHG Project Plan would not have to provide any documentation of GHG mitigation as an original objective as long as they could meet the other additionality tests. This would remove a safeguard, but may be more realistic. Do the reviewers feel we should delete 5.1? | You choose. | n/a | OK |
| 2-61 | 6.0 | *These risks must be assessed as detailed in the ACR Forest Carbon Project Standard.* <br><br> *Project Proponents shall conduct a risk assessment using the latest ACR-approved tool.* | Correct, the reference here to the *ACR Forest Carbon Project Standard* was unnecessary (and confusing, since these are not forest projects). We have edited it to read: <br><br> "These risks must be assessed using the latest ACR-approved tool." | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | This is confusing. Which one should be used? Or are these two the same? If so, why use different names? Correct or simplify. | which currently is the latest published version of the Verified Carbon Standard *AFOLU Non-Permanence Risk Tool.* | | | |
| 2-62 | 6.0 | *Buffer contributions for projects on public lands, that wish to claim credit for biotic sequestration, must be made in non-project ERTs.*<br><br>Non-project or "non-public" land? Why not allow buffer contributions from the private land part of a project? Please clarify | We were thinking of the scenario where a GLLM project implemented entirely on public lands would be required to make its buffer contribution in non-project ERTs (e.g. ERTs purchased from a separate project registered on ACR), not in project ERTs from a non-public portion of the project. To be specific, any GLLM project would be allowed (and a project on public lands would be required) to calculate its buffer contribution and then, *in lieu* of deducting that percentage from the project's own ERTs, could deposit in the ACR Buffer Account ERTs purchased from another ACR project.<br><br>You are correct that the buffer contribution could also come from parts of the same project taking place on private lands or facilities; but practically speaking, it would be difficult to distinguish these ERTs from those from the public lands portion of the project, since ACR serialization of ERTs is currently only by project and vintage year. To avoid confusion, and because we think Project Proponents will anyway find it financially advantageous to make their buffer contribution in cheaper non-project ERTs and market all their project ERTs, we have retained the current wording. | Accepted | n/a | OK |
| 2-63 | 6.0 | Clarification and rewording required<br><br>*Project risk is reassessed every five years, on verification, except in the case of an unintentional(?) reversal triggering an immediate reassessment of the project* | The intent here was that any reversal would trigger an immediate risk reassessment. An intentional reversal (decision to opt out of a GLLM project achieving enhanced biotic sequestration) should also trigger a project risk reassessment, and presumably a higher risk buffer for any | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | *baseline, risk category and buffer contribution.* | portion of the project that continues. | | | |
| 2-64 | 6.0 | *Project risk is reassessed every five years, on verification, except in the case of a reversal triggering an immediate reassessment of the project baseline, risk category and buffer contribution.*<br><br>Comment: It will be useful to clarify the situations and criteria to be used for initiating reassessment of the project baseline, risk category, buffer contribution. Is it after any event or certain criteria to be satisfied for initiating the reassessment. | We agree it is not sufficiently clear how large a reversal must be in order to trigger reassessment of the project baseline, risk category, and buffer contribution. This really needs to be addressed at the *ACR Standard* level, not in this methodology, so we will endeavor to make it clearer there. For example, we may state that any reversal over [20,000] tons or [5]% of issued offsets, whichever is larger, requires reassessment of the project baseline, risk category, and buffer contribution. We will have to include this in the next revision of the *ACR Standard* and then the GLLM methodology itself (and other methodologies crediting reversible biotic sequestration) will simply be governed by the rule in the *ACR Standard.* | Accepted | n/a | OK |
| 2-65 | 7.0 | Equation 1<br><br>Comment: I see now that the ACR uses only the term emissions reduction. I suppose that there was quite a bit of expert discussion to reach such a term, but I am not aware of the arguments to blur or even eliminate the distinction between ERs and sequestration, particularly when the protocol itself needs to track and treat them separately. Without knowing the arguments, I strongly oppose an equation that adds sequestration with ERs and yields pure ERs. At best, this does not follow the conservativeness principle. | The general definition of "net emission reductions" is provided in the *ACR Standard*:<br><br>Net Emissions Reductions are GHG emission reductions **or removals** created by a project activity, minus the baseline scenario and any deductions for leakage.<br><br>So is defined to include both emission reductions and enhanced sequestration.<br><br>Here, within each emission source module (enteric, manure, fertilizer, and fossil fuel), project emissions are subtracted from baseline emissions and then adjusted for uncertainty, yielding the parameter (E_ENT, E_MAN, E_FERT, E_FF) that is transferred over to Equation (1) in FRAMEWORK-GLLM.<br><br>In the biotic sequestration module, Equation (5) sums the | I questioned the use of ERT to refer to sequestration. It appears that this is simply a poor –in my opinion-- choice for the ACR Standard. Probably resulted from a lack of available acronyms or terms. It seems to me that we agree that reduction of emissions is fundamentally different from sequestration. Somehow the ACR | Understood. "ERT" was chosen as the ACR unit of exchange (encompassing both emission reductions and enhanced sequestration) many years ago. It was also one of those clever acronyms since the organization that founded ACR was called the Environmental Resources Trust (ERT). So it seemed clever at the time, I suppose, to | OK (clarification could be added that the activities target both emission reductions/r emovals. Theerfore, as per the ACR Standard, ERT is applicable |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | carbon stock in the with-project case minus the carbon stock in the baseline case, by stratum, which is then adjusted for uncertainty. This results in the parameter S_BIO that is transferred over to Equation (1) in FRAMEWORK-GLLM, with the subtraction for the required buffer deduction.<br><br>Finally, the calculation of net emission reductions is adjusted for leakage using the parameter E_LK, which comes from the L-GLLM module and includes both activity shifting and market effects leakage, if required.<br><br>In this way both emission reductions and sequestration are accounted for, adjusted as needed for uncertainty and reversal risk (in the case of biotic sequestration).<br><br>If we are misunderstanding the reviewer's concern, please clarify and we will investigate whether adjustments are needed. | defined the phrase "emission reduction" to encompass both types of processes.<br><br>At this point, I would say that if you are sure that the methodology is not negatively affected in form or consequence by the definition, I will leave it at that. | call our credits ERTs.<br><br>Similarly, the Climate Action Reserve has "Climate Reserve Tonnes" or CRTs, the Verified Carbon Standard has VCUs, and so on.<br><br>Anyway there was no intent, then or now, in using "ERTs" to suggest the credits are only for emission reductions and not enhanced sequestration. | to both types of activities) |
| 2-66 | 7.0 | Reword<br><br>Emission reduction tonnes (ERTs) awarded to the GLLM project activity at time $t$; $tCO_2e$. | Acronym inserted. | Accepted | n/a | OK |
| 2-67 | 7.1 | Reword the section title<br><br>7.1 Leakage | Rewording accepted. | Accepted | n/a | OK |
| 2-68 | 7.1 | *Emissions from market-effects leakage (E_ME) may be positive or negative. If project output is more than 3% less than baseline output, market-effects leakage must be calculated; E_ME, as derived in equation (2) of L-GLLM, will be positive.*<br><br>Comment: Better to define significance of | It is correct that 5% is used for adoption rates in the methodology, but the 3% used for leakage in L-GLLM is consistent with ACR's treatment of significance in the decision to include/exclude GHG SSRs from the project boundary. The *ACR Standard* states that "If exclusion of a pool or source is not conservative, Project Proponents may apply a significance tool to determine whether the pool or | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | emissions and removals and adopt a common metric for categorizing emissions/removals to be significant/ insignificant and adopt a common threshold for insignificance, for example 5%, which is also a unit defined for significance/insignificance of adoption rate in this methodology. | source may be considered insignificant. Insignificant pools and sources may be excluded if all combined pools and sources thus excluded represent less than 3% of the *ex ante* calculation of emission reductions/removal enhancements" (Chapter 2.D).<br><br>See response to comment 2-9. | | | |
| 2-69 | 7.1 | *Double crediting would occur whenever the emission reductions being credited as positive leakage could also be claimed by other producers or production facilities, e.g. where fossil fuel emissions or emissions from fertilizer production are "capped" in a regulated system and/or where crediting is occurring for reductions in these sectors.*<br><br>Comment: As estimation of positive leakage is subject to assumptions on the activities, technologies and behaviour of actors outside the project, there is likely to be significant subjectivity in the assessment of leakage and it also puts burden on ACR and VVBs for verifying the nature and magnitude of leakage.<br><br>Therefore, it is pragmatic to treat the all leakage except market leakage to be zero under the methodology without the need for assessment. | Regarding the comment "it is pragmatic to treat the all leakage except market leakage to be zero under the methodology," we do not agree that projects should be allowed to ignore activity shifting leakage altogether. They are allowed to ignore it as long as project output is no more than 3% less than baseline output. Otherwise, they simply have to monitor the activities of the baseline landowners/land users. Section 2.0 of L-GLLM provides methods to do this that we do not think are overly onerous.<br><br>The reviewer seems to agree that market leakage should be assessed. We agree with the comment that "estimation of positive leakage (we would say actually, of any type of leakage) is subject to assumptions on the activities, technologies and behaviour of actors outside the project…", but we have tried to remove the subjectivity in the assessment of leakage by providing, in section 3.0 of L-GLLM, methods for quantifying market effects leakage that are based on supply and demand elasticities for which default values are provided. We think this removes much of the subjectivity or difficulty to verify. The VVB only has to check that the default values have been applied correctly.<br><br>The quoted section 7.1 of FRAMEWORK-GLLM is only | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | pointing out that the market effects leakage deduction can go in either direction. We do not think it is any more or less subjective for positive than for negative market effects leakage, considering the way market effects leakage is handled in this methodology with a default value. | | | |
| 2-70 | 8.0 | Reword the section title<br><br>8.0 Monitoring | Rewording accepted. | Accepted | n/a | OK |
| 2-71 | 8.1 | This section seems to deal with three different things, monitoring, verification and validation. Thus, it should have clear subsection or paragraphs dealing with each one. | Good point. We have changed the section title to 8.0, Monitoring, Validation and Verification, and moved the paragraphs on validation and verification to separate sub-sections. | Accepted | n/a | OK |
| 2-72 | 8.1 | Please describe what happens when a cohort is added in year 6 | Per section 4.2, a new Cohort added to a PoA in year 6 would have a Start Date in year 6 and Crediting Period from year 6 to 16 (or year 6 to 46 in the case of GLLM activities impacting biotic sequestration only, or for the biotic sequestration component of GLLM activities impacting multiple SSRs).<br><br>As regards validation (now moved to new sub-section 8.6), the new Cohort added in year 6 would have a Cohort Description prepared by the Project Proponent, which would be reviewed by the VVB to ensure that the new Cohort meets all eligibility criteria established in the validated GHG Project Plan for the original PoA and that the Crediting Period for the new Cohort is correctly specified.<br><br>As regards verification (now moved to new sub-section 8.7), the new Cohort added in year 6 would not have to be field-verified until year 10, at which time it would be field-verified along with any earlier Cohorts, then proceed on | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | the regular 5-year field verification cycle. In years 6-9, the new Cohort could be credited on the basis of desk review verification. | | | |
| 2-73 | 8.2 | Consider rewording the section title<br><br>8.2 Variables to be Monitored<br><br>Comment: I prefer the term "variable." The amount of aboveground biomass is a variable, as is carbon sequestration resulting from it. Buffer% is a parameter. In general one measures and monitors variables and uses them with parameters obtained elsewhere or mandated. Not a big deal, but it does not hurt to use terms as clearly as possible. | We have substituted "data" for parameters, since these come from the section at the end of each module called "Input Data Sources and Requirements." | Accepted | n/a | OK |
| 2-74 | 8.2 | *One hundred percent of the data should be monitored if not indicated otherwise in the parameter tables of the relevant module.*<br><br>I do not understand what this means. How does one monitor data? What is the intended meaning of this statement? | The parameter tables of each module (actually the tables in the "Input Data Sources and Requirements" section at the end of each module) indicate how much monitoring is required for each parameter: for example, parameter $BW_m$ in A-ENTERIC (body weight of animal under management $m$) must be assessed through direct measurement of mean animal weight, once a year for dairy and for beef, at the time of vaccination or any other activity in the chute. | This is an issue of choice of terms etc. Instead of "monitoring data" I think you mean that certain parameters, or more generally, quantities have to be measured periodically. There is probably a better way to state what you mean. I just want to comment that the current wording was not to me. I would not be able to conduct the monitoring properly just by reading these | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | instructions, but I am sure that those who will read these instructions will know a lot more and will understand the meaning based on their background. | | |
| 2-75 | 8.2 | *In the event the relevant accounting module specifies use of a model, or allows various models to be used, the input parameters required by the model used must be monitored.*<br><br>Standard modeling methodology uses the term input and output variables, versus model parameters that are typically a structural part of any model delivered to the user. | Rewording accepted. | Accepted | n/a | OK |
| 2-76 | 8.5 | Proponent should select values that will lead to an ~~accurate~~ estimation of net emission reductions and removal enhancements, taking into account uncertainties.<br><br>Comment: The principle of conservativeness mandates biased, not accurate estimations. | We assume the reviewer meant to write unbiased rather than biased. We have replaced the word "accurate" with "unbiased." | No, I meant biased. My understanding is that estimations are purposefully biased down to be conservative. Such is the fundamental basis of conservativeness. Given the uncertainty, methodologies mandate that estimates be biased down. Because of this, biased (the opposite of | Now we understand. We think of "biased" as meaning biased in a non-conservative direction, i.e. over-crediting. You are right that conservativeness dictates estimates be biased downwards. We have revised the sentence to read:<br><br>"… Project Proponent should select values that will lead to a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | | | accurate) estimates are mandated. I guess this will sound odd to the layperson (it sounded wrong to you!) so you may want to eliminate the adjective altogether, or call it "conservative" instead of "accurate" or "unbiased." | **conservative** estimation of net emission reductions and removal enhancements, taking into account uncertainties." | |
| 2-77 | A.4 | It is not clear if the debundling happens before or after registration of the activity under consideration. Is the intent to force Project Proponents to include as many activities and land units as possible in the project to begin with? If so, how could cohorts appear in the future? | The intent of prohibiting debundling is to keep Project Proponents from splitting what could be a single project or Cohort into more than one project or Cohort in order to keep it below a relevant threshold (5,000 or 60,000 tCO$_2$e) and not be required to use the accounting module(s) that would otherwise be required. Criteria a) through d) in A.4 are an attempt to identify that debundling is occurring; if a project or Cohort meets all four criteria, it is considered likely that the Project Proponent could have included the new project or Cohort in an existing Aggregate or PoA and is only splitting it to "game" the accounting thresholds.

As for the timing question: we assume at the time of registration, the Project Proponent will have included in an Aggregate or PoA all the producers that can practically be included at that time. The economies of scale from including more producers should more than outweigh any benefits of staying below an accounting threshold. If, more than two years later, the Proponent has another Cohort of producers to add, this would not meet criterion c) so would not be considered debundling and would be | Just make sure the rules are not so restrictive that any attempt to make a new project in an area with project would be interpreted as "gaming" the system. | Agreed. Since all four criteria in A.4 have to be met for a project to be considered debundled, and thus disqualified, we think activities that are truly new (not just "gaming" by splitting activities that could have been part of an existing Aggregate or Cohort) will not trigger all four criteria to be considered debundled. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | allowed. If the Proponent wishes to add a new Cohort less than two years later, this would trigger criterion c) but it seems unlikely that all three other debundling criteria would be met, especially criterion d) – since if the new producers or facilities are within one mile and implementing the same GLLM activity, presumably it would make more sense to include them in the earlier Cohort.<br><br>Please let us know if this does not address the reviewers' concern. We could decrease criterion c) to one year, if the reviewers feel two years will disqualify what should be considered not debundling but legitimately distinct Cohorts? Please advise if you think criterion c) should be "Registered within the previous year." | | | |
| 2-78 | A.4 | *For the purposes of registration of an Aggregate or PoA, a proposed project activity or Cohort shall be deemed to be a debundled component of an Aggregate or PoA if there is already a project activity or Cohort:*<br><br>a) *Registered by the same Project Proponent; AND*<br><br>b) *In the same GLLM project category and technology/measure; AND*<br><br>c) *Registered within the previous 2 years; AND*<br><br>d) *Whose project boundary is within 1 mile of the boundary of the proposed project activity or Cohort, at the closest point.*<br><br>Comments: | See below | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | a) The debundling rules under CDM with regard to same project participant have run into interpretational differences. For example, each cohort may comprise different project participant but if the activity if the registration of activities with different project participants is coordinated by a common entity, this has been interpreted as breaching debundling rules. Projects with common coordinating entities but with different participants in each cohort/activity have represented against the same project proponent provision of CDM bundling rules.<br><br>b) The 1 km threshold does not make sense for land use projects such as GLLM as this prevents participation of other entities in the vicinity of a project although these are independently owned and operated.<br><br>Considering the geographic aspects of project location, the 1 km restriction for transport projects had been removed under CDM and projects within 1 km are allowed for bundling for renewable energy projects (Annex 13, EB54) | "Project participant" is here defined as an individual producer participating in an Aggregate, or in a Cohort of a PoA. These would be coordinated into an Aggregate or Cohort by the Project Proponent, i.e. the project developer or aggregator ("coordinating entity" in CDM parlance). So the inclusion of different project participants under the same Project Proponent would here only be considered debundling if all four criteria were met, i.e. if the Project Proponent tries to put these project participants in a separate Aggregate or Cohort implementing the same GLLM activity, registered less than 2 years after, and with boundaries less than 1 mile from, an already existing Aggregate or Cohort.<br><br>The 1-mile criterion does not prevent participation of other producers in an Aggregate or Cohort; it only prevents (or attempts to prevent) a Project Proponent from putting these producers into a separate Aggregate or Cohort, in order to stay beneath a relevant accounting threshold, when they could be added to an existing Aggregate or Cohort. Fields or facilities less than a mile away, but registered by a different Project Proponent, would not meet criterion a) so would not be considered debundled.<br><br>In this methodology the entire intent of section A.4 is to prevent "gaming" of the accounting thresholds. Since the methodology allows simplified accounting for micro- and small-scale impacts, we thought it important to include some provision to prevent manipulation of those thresholds. | | | |

### 3. A-MICROSCALE documentation

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 3-1 | 1.0 | Typo<br><br>The tool synthesizes annual estimates of net GHG reductions achieved per year from changing grazing land and livestock management activities in each of five SSRs (sources, sinks and reservoirs): enteric methane, manure methane, nitrous oxide from fertilizer use, fossil fuel emissions, and biotic sequestration in above- and belowground biomass and soils. | Language has been revised. | | | OK |
| 3-2 | 2.0 | Table 1<br><br>There was some confusion. Please add the following text under the table<br><br>The choices of geographical area, Climate Region, Soil Type, Land Cover Type, Management Type, Management Inputs follow the terminology and definitions from the IPCC Tier 1 Methodology | Text has been added to Table 1. | | | OK |
| 3-3 | 2.1 | Is a "grassland" the same as "rangeland"? If so, suggest making that clear in Table 1. If not, where does rangeland fit in the document? | For the purposes of the calculations, grassland and rangeland are considered the same. This is now indicated in Table 1. | | | OK |
| 3-4 | 2.1 | Is IPCC Tier 1 the best model available? Is it worth a short paragraph stating why there aren't better options available? | The purpose of the MICROSCALE is to quickly generate first order approximations of GHG benefits from changing livestock practices. We did not feel it was necessary to state why there aren't better options available than IPCC. These "better options" are covered in SMALLSCALE and full scale modules. | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 3-5 | 2.2 | Typo<br><br>In cases where trees are planted in the project area, the user is required to input the area over which plantings occur, a value that may be the same or different from the total size of the project area. | Language has been changed as suggested. | | | OK |
| 3-6 | 2.2 | *Average carbon accumulation rates in trees planted as part of the project activity are estimated using default IPCC Tier 1 rates that vary by geographic region and climate region. Total biomass accumulation in the project area is therefore estimated as the product of the average biomass accumulation rate (in t C ha$^{-1}$ yr$^{-1}$) and the land area over which trees are planted (ha). Default values for biomass accumulation are listed in Appendix 1.*<br><br>Comment: It occurs to me that the protocol should be careful to balance simplicity of calculation and verification with accuracy. It is very likely that the actual accumulation of C by trees depends strongly on the tree density, a variable than can be easily monitored. If such measurements are not required, I can see how plantings with very poor tree establishment could lead to gross overestimations of sequestration, particularly if the entity doing the verification uses local agents to do the inspections and decide is an area is or is not forested. | The purpose of the MICROSCALE tool is to provide first order estimates of GHG benefits WITHOUT monitoring requirements. If sequestration is overestimated, then the user will be required to bump up and use higher level modules (SMALLSCALE or large scale) and monitoring will be required. | | | OK |
| 3-7 | 3.1 | Table 2 there is a typo on the table. In the second column next to Fat content in milk. It should read | Corrected. | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | "lactating cows". | | | | |
| 3-8 | 3.1 | Table 2. Actually there is Canadian data to show a decrease in CH4 emissions with cold temperatures when rate of passage increases despite increases in intake. See: Okine E.K., Mathison G.W., Hardin R.T., Effects of changes in frequency of reticular contractions on fluid and particulate passage rates in cattle, *J. Anim. Sci*. 67 (1989) 3388–3396. | The approach in MICROSCALE is based on IPCC methods. The article cited appears to address the effects of weights in the rumen on passage rates, not temperatures. | | | OK |
| 3-9 | 3.1 | Typo The enteric fermentation module applies IPCC Tier 2 equations to estimate changes in methane production as a result of a change in herd management. IPCC Tier 1 default values are built in for certain parameters, but a user can apply project-specific values if desired. | Text has been changed as suggested. | | | OK |
| 3-10 | 3.1 | Table 2 *Number of animals produced per year* Comment: This term is too vague. What is the number of animals produced? A formula has to be provided for this. For example, I buy 100 weaned calves in April and I sell them for backgrounding or pre-feedlot in September. Then I sell grazing rights to a cow-calf producer whose 50 cows remain in my land until April. How many animals have I produced? | We have added a feature in the enteric tab of the MICROSCALE tool that allows the user to account for the herd by month rather than as an annual total. This facilitates the accounting of animals moving within subcategories as well as animals moving in and out of the herd, as in the case of cow/calf operations. | | | OK |
| 3- | 3.1 | Table 2 | This term comes from IPCC language. The purpose of | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 11 | | *Collected only for mature cattle.*<br><br>Comment: Why only mature? Do you mean that the % calving of heifers has to be ignored? Also, in some regions of the world there may be a significant difference between % calving and % weaning. A peak of mortality takes place during the perinatal period. | MICROSCALE is to avoid complications. | | | |
| 3-12 | 3.1 | Table 2<br><br>*However, slaughter-weight data should not be used in place of live-weight data as it fails to account for the complete weight of the animal.*<br><br>Comment: Weight loss between farm and slaughter can be estimated accurately on the basis of time and conditions during transportation. There are well known factors for those losses that could be used to back-calculate farm weights. | This language was taken directly from IPCC. The purpose of MICROSCALE is to avoid monitoring requirements for a first order approximation. We don't want the user to have to know time and conditions during transport. | | | OK |
| 3-13 | 3.1 | Table 2<br><br>*For cattle, the yearly average weight for each animal category (e.g., mature beef cows) is needed.*<br><br>Comments: Average weight is needed, but it is also acknowledged that weight changes significantly over time. Should weights be estimated periodically and averaged? That would not be feasible. Then, when should weights reflect the average yearly weight? | This is an IPCC term. The point of MICROSCALE is to simplify, and although there is variation in weight over the year, the entry should reflect whatever data are available on hand to do a first order approximation. | | | OK |
| 3- | 3.1 | Table 2 | This is an IPCC assumption and methodology, used to | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| 14 | | *Mature animals frequently lose weight during the dry season or during temperature extremes and gain weight during the following season. However, increased emissions associated with this weight change are likely to be small. Reduced intakes and emissions associated with weight loss are largely balanced by increased intakes and emissions during the periods of gain in body weight.*<br><br>Comment: The fact that metabolic energy is used for maintenance and (milk production) much more efficiently than for growth makes me think that the balancing idea needs to be carefully checked. This is compounded by the fact that when animals lose weight, it is usually due to the fact that forage quality is very low and thus more methanogenic. | generate a first order estimate of GHG benefits. This issue is not within the scope of MICROSCALE to address. | | | |
| 3-15 | 3.1 | Table 2<br><br>*Considering the average temperature during winter months, net energy for maintenance requirements may increase by as much as 30% in northern North America.*<br><br>Comment: Increase with respect to what? Both situations seem to refer to North America. | This is taken straight from IPCC language. Outside the scope of MICROSCALE to address. | | | OK |
| 3-16 | 3.1 | Table 2<br><br>*Average mature weight of an adult female*<br><br>Comment: It sounds like this weight refers to the genetic potential for mature body weight. If so, that is a parameter that does not vary for a given | This is an IPCC term and was left as written. If there is just one weight per breed, leaving the term 'average' does not effectively change the meaning or the value. | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | breed or strain. There should be nothing to average. It would be just a matter of determining the theoretical genetic potential. | | | | |
| 3-17 | 3.1 | Table2 *This is termed 'reference weight' or 'final shrunk body weight'.* Comment: Why "shrunk?" In the previous section about weight there was an emphasis on farm weight. | This is also an IPCC term, no change. | | | OK |
| 3-18 | 3.1 | As indicated in general comments, the threshold for Microscale is very low for implementing the project and for accounting emissions. Increase of Microscale threshold may alleviate the regulatory burden for projects. It is suggested to consider the higher emission reduction threshold for Microscale activities on the lines of the threshold defined for Microscale activities under the CDM, which is 20,000 t CO2e (Annex 26, EB68). | See response to 2-21. | | | OK |
| 3-19 | 3.2 | The Microscale document presents the details of equations of each module. However it does not guide the user on how the document is to be used in identifying the relevant emissions, data sources, and accounting of emissions using the Microscale spreadsheet. In this context, as noted in general comments, it will be useful to include a flow chart on the types of emissions to be accounted in the Microscale document so that user has step-wise guidance in identifying the emissions and accounting them | The "MICROSCALE documentation" is meant as an explanation on what has gone into the development of the A-MICROSCALE spreadsheet. There is a separate instructions tab in the spreadsheet itself that lays out how to use it. It includes stepwise guidance. All emissions must be accounted for in MICROSCALE, as written in the instructions tab of A-MICROSCALE. | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | using the Microscale spreadsheet. | | | | |
| 3-20 | 3.2.1 | Here and across the document—more references to the source of the equations are needed. Table 3 should have a reference to the IPCC document as a footnote to the table. | The last sentence in the first paragraph of Section 3.2.1 states "The equations and text are taken directly from Chapter 10 of the 2006 IPCC Guidelines for AFOLU." We have added references to tables so that they can stand on their own but we found it unnecessary to continually cite the same source throughout. Instead we cite up front. | | | OK |
| 3-21 | 3.2.1 | Is the "a" in Ca supposed to be a subscript? | Ca has been subscripted in Table 4. | | | OK |
| 3-22 | 3.2.1 | Feed digestibility defaults….Table X are based… suggest adding the table number in | Changed to Table 5. Thank you. | | | OK |
| 3-23 | 3.2.1 | Equation 4 <br><br> Typo <br><br> $Cf_i$ = a coefficient that varies for each animal category as shown in Table x, MJ day$^{-1}$ kg$^{-1}$ <br><br> Which Table? | This table reference was omitted. $Cf_i$ for non-lactating cows, lactating cows and bulls are given in the text directly above Equation 3. | | | OK |
| 3-24 | 3.2.1 | Equation 4 <br><br> °C = mean daily temperature during winter season in degrees C <br><br> Comment: The use of the symbol for a unit to represent a quantity is not good practice. I would call it T, or temp and indicate that it has to be in C. I also think that this equation probably applies only within a range in temperature, which should be specified. Or can I use it when temperature is 35 C? | This is taken directly from IPCC equations. To avoid confusion, we did not alter IPCC notation in our equations. We added "if <20 C". | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 3-25 | 3.2.1 | Table 5<br><br>Comment: What is the basis for these estimates? | IPCC. Citation added to table caption. | | | OK |
| 3-26 | 3.2.2 | Please reference the source of the 3.0% and the 6.5%. There are no references to where equation 12 or 13 are from. | IPCC. | | | OK |
| 3-27 | 3.3 | There is also no link/reference in Microscale document about the steps to be followed in completing the respective modules of Microscale spreadsheet. Providing such guidance can help the user in completing the Microscale estimation in a systematic way. | The "MICROSCALE documentation" is meant as an explanation on what has gone into the development of the A-MICROSCALE spreadsheet. There is a separate instructions tab in the spreadsheet itself that lays out how to use it. | | | OK |
| 3-28 | 3.4 | It will be useful include a section on QA/QC in the Microscale document to provide guidance on ensuring the quality of the data used in the Microscale spreadsheet. | The Microscale spreadsheet will be validated by an appropriate third party as a QA/QC procedure for the default data and calculations provided. QA/QC procedures for data entered by the user is outside the scope of the current effort but may be revisited at a later date. | | | OK |
| 3-29 | 4.2.2 | Again reference the source of the equations. | IPCC | | | OK |
| 3-30 | 4.2.2 | Table 9—please supply references in a footnote | IPCC. Citation added to table caption. | | | OK |
| 3-31 | 4.2.2 | *Indirect emissions from leaching are not included in the estimates.*<br><br>Comment: Does this mean that only runoff is considered? I do not understand the difference between direct and indirect emissions. Reading on I get the impression that indirect emissions | Text has been clarified. Only indirect emissions from volatilization are included, not indirect emissions from runoff/leaching. | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | refer to volatilization of NH4, NOx and later deposition and oxidization. If this is correct, is should be clarified. | | | | |
| 3-32 | 4.2.2 | Equation 15<br><br>$N_{ex(T)}$ = annual N excretion for livestock category T, kg N animal$^{-1}$ yr$^{-1}$<br><br>Comment: Would it not be easy to base excretion rates on actual N intake? Most of the information is already entered for previous calculations. | We used IPCC equations to generate estimates; it is outside the scope of MICROSCALE to require that N intake rates be entered or to predict N excretion rates from intake rates. | | | OK |
| 3-33 | 4.2.2 | Table 8<br><br>Why use these if actual animal weights are required in section 3.1? Either use project weights or allow the use of this table in section 3.1 | Default weights are provided in the tool but are overridden with project-specific weights if entered by the user. | | | OK |
| 3-34 | 4.2.2 | Equation 17<br><br>Is Gas subscript or not? Use consistently. | Fixed. | | | OK |
| 3-35 | 4.2.2 | Table 9<br><br>What about manure deposited directly on pastures? | This is covered in the FERTILIZER module within the MICROSCALE tool. | | | OK |
| 3-36 | 5.1 | *At this time, the annual amount of N in crop residues and the amount of N in mineral soils that is mineralized in association with loss of soil C from soil organic matter as a result of changes to land use or management is not included in the estimates, nor are N$_2$O emissions from flooded rice.*<br><br>Comment: Then, flooded rice should not be an | This was an oversight and included from IPCC text but is irrelevant so has been removed. Flooded rice is unlikely to be an activity related to changing livestock practices. | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
|   |      | allowable activity. |  |  |  |  |
| 3-37 | Appendix (all) | References for the tables should be added | References have been added in the caption to each table. Thank you for this suggestion. |  |  | OK |
| 3-38 | Appendix 1 | Table A.1<br><br>Nominal error of +- 90%... that is not clear to me. Clarify. | Taken directly from IPCC and not applicable to any of the calculations within MICROSCALE. Therefore, outside this tool's scope to address/clarify. |  |  | OK |
| 3-39 | Appendix 1 | Improve the quality of the "cut and paste" tables | The tables are copied from IPCC. We don't want to hold up the remainder of the review process, but will see if we can re-create them in Word before the final publication of this document. |  |  | OK |

## 4. A-MICROSCALE Spreadsheet

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 4-1 | General | The Excel spreadsheet should be prepared to a professional level. For example, all cells that are not supposed to be modified by the user should be protected accordingly. Security should be implemented. | The spreadsheet was provided to the peer reviewers in unlocked form so that all sheets and calculations could be reviewed. The final, published form of the A-MICROSCALE tool will be locked and protected. | | | OK |
| 4-2 | General | Some features of the xls files do not work:<br><br>UNIT CONVERTER<br>9 acres = 17.00 hectares (ha) | This should be functional. Only one-way conversions are needed (conversion from acres to hectares), as all calculations in the spreadsheet require area to be in hectares. | | | OK |
| 4-3 | General | I recommend using named ranges in the xls spreadsheets, so formulas resemble those in the documentation. Spreadsheets should be professionally validated with standard examples. | The team is currently in the process of testing the MICROSCALE tool with real data. Named ranges in the spreadsheet are used in some cases, but do not link to the documentation. This is outside the scope of our effort at this time; the main goal was to make the spreadsheet functional. | | | OK |
| 4-4 | Enteric spreadsheet | The "click on category to see description" is nonfunctional on my computer. | This has been fixed. | | | OK |
| 4-5 | Enteric spreadsheet | Are mature females beef cows? If so why not say so? | Definition of mature females is given if the user clicks on the category: "Cows used to produce offspring for meat OR cows used for more than one production purposes: milk/meat" | | | OK |
| 4-6 | Enteric spreadsheet | International feed numbers were not in the documentation. Perhaps that should be added with where one might get that number. These numbers are not listed in the table of required inputs either. | This number is not required to be input by the user. The feed number is associated with the name of the feed as given in the dropdown menu that a user can select from. The IFN is there only for | | | OK |

| # | Sec. | 1<sup>st</sup> Review | Response | 2<sup>nd</sup> Review | Response | Final |
|---|------|----------------------|----------|----------------------|----------|-------|
| | | | reference. | | | |
| 4-7 | Instructions | Purpose and Applicability, line 21: delete 'At a minimum' | Done. Numbers have also been added to worksheet names so that the order in which they should be filled out is more intuitive for the user. | | | OK |
| 4-8 | Manure | Line 14, Nmass (kg), shouldn't this be animal mass? | Yes, this is animal mass and is linked to the data entry in the enteric tab "average live-weight of animal (kg). Nmass is not seen by user in the final form of the spreadsheet, it is an internal calculation. | | | OK |
| 4-9 | Manure | Lines 61-69. The Nex seem high, especially for Africa and Middle East (see Powell et al., 2013; attached) | These are IPCC default values. It is outside the scope of this effort to re-evaluate IPCC default values and whether they should be updated with newer information. | | | OK |
| 4-10 | General | The Microscale document presents the details of equations of each module. However it does not guide the user on how the document is to be used in identifying the relevant emissions, data sources, and accounting of emissions using the Microscale spreadsheet.

In this context, as noted in general comments, it will be useful to include a flow chart on the types of emissions to be accounted in the Microscale document so that user has step-wise guidance in identifying the emissions and accounting them using the Microscale spreadsheet. | No flowchart has been developed on the emissions to be accounted in the MICROSCALE tool because ALL emissions must be accounted for in the MICROSCALE tool.

However, at the suggestion of the reviewers, a flowchart or decision tree has been added to section 2.1 of FRAMEWORK-GLLM. This provides guidance to users on which modules are required in various circumstances depending on the project location and *ex ante* estimated scale of GHG impacts.

Guidance for how to use the MICROSCALE spreadsheet is provided in the spreadsheet itself. The "MICROSCALE documentation" file is just the backup documentation for the data sources and | | | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | calculations. | | | |
| 4-11 | General | There is also no link/reference in Microscale document about the steps to be followed in completing the respective modules of Microscale spreadsheet. Providing such guidance can help the user in completing the Microscale estimation in a systematic way. | The tab 'Purpose and Applicability' has been renamed to 'Instructions' to provide clearer direction on where the user should look for guidance on the steps to be followed in completing the modules of the Microscale spreadsheet. | | | OK |
| 4-12 | General | It will be useful include a section on QA/QC in the Microscale document to provide guidance on ensuring the quality of the data used in the Microscale spreadsheet. | The Microscale spreadsheet will be validated by an appropriate third party as a QA/QC procedure for the default data and calculations provided. QA/QC procedures for data entered by the user is outside the scope of the current effort but may be revisited at a later date. | | | OK |
| 4-13 | Biotic | | | I tried to create a model for eastern Europe. I could only choose US soil names from the dropdownlist! | The dropdown includes a 'Not in the U.S.' option (the first option in the dropdown list) if the project is not located within the U.S. This option should be selected, and clicking on soil type should display a list of generic IPCC soil types rather than US specific soil types. | OK |
| 4-14 | Enteric | | | The dropdown list for different regions allows only north America. Is this down | This was an error that has been fixed. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | intentionally? If so that should be stated in the documentation and the dropdownlist should be removed. | | |
| 4-15 | Enteric | | | Calves on milk has no description | A description has been added. | OK |
| 4-16 | Enteric | | | I accidentally changed a grey cell. Perhaps they should all have a warning to say you are changing a default value | We added a series of buttons in the tool to enable a user to restore values to the default settings if necessary. | OK |
| 4-17 | General | | | Instead of having to add country and country specific data on each sheet. You could have that on an extra sheet. | The IPCC default values are based on how that default value was defined – geographic regions for enteric defaults are not the same as the geographic regions for defining biotic defaults. therefore each tab needs its own specific region identified. | OK |
| 4-18 | Fertilizer | | | When I came to using this sheet I was surprised to see that I was already savings emissions even | These cells have been changed so that the user must define what % of organic fertilizer (manure) is applied to | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | | | though I hadn't entered anything on the page. This was because my manure was automatically being spread. Maybe the page should read organic and inorganic fertilizer emissions | fields, and the manure tab has been changed to zeros so that there are no underlying assumptions about how manure is treated – the user must enter these data. | |
| 4-19 | Fertilizer | | | Should columns C and F be grey? These are default values. | The color of these cells has been changed. | OK |
| 4-20 | Fossil fuel | | | For some reason when I burnt 5000 liters of gasoline in the baseline the emissions are 11 t, but when I burn 5000 liters in the project they are 44 t. So by burning the same amount I actual reduce emissions ????? Please check the conversion and equations FOR ALL fuels. It looks like the conversion is being applied to the baseline and not to | This has been fixed, there was an error in the formula for converting gallons to liters in the project case. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
|   |      |           |          | the project (or vice versa) |  |  |
| 4-21 | General |        |          | Add a version number to the cover sheet. | Added Version 1.0 to the cover sheet. | OK |

## 5. A-SMALLSCALE

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 5-1 | General | It is unclear from the review of small scale and Microscale modules as to the major differences in accounting of emissions in small scale and Microscale sizes except for the difference in thresholds.<br><br>It is also unclear why a common module is not feasible for Microscale and small scale project sizes by clarifying the types of emissions to be accounted in respective size categories using one common spreadsheet format.<br><br>Such an approach may simplify the accounting procedures for both Microscale and small-scale cases without the need for a separate module for small scale project size. | A-SMALLSCALE cannot be used outside the US., since the COMET-FARM model it relies on has only been developed for the U.S.<br><br>Data inputs can be easier in A-MICROSCALE, but in the U.S. a user qualifying for A-MICROSCALE still has the option of using A-SMALLSCALE which does a much more accurate emissions assessment. | Accepted | n/a | OK |
| 5-2 | General | Make sure that correct units are used. Some equations use % where they should use fractions or include a denominator of 100. I suggest doing away with any mention of percentages anywhere. It is superfluous and it promotes errors like those I found.<br><br>All equations for aggregation of errors appear to assume independence of results over parcels and between baseline and project. Depending on the source of randomness that is being addressed, I question the assumption. Weather will introduce positive covariance over time.<br><br>Conversion from kg of N2O to CO2e differs from that used for the Microscale protocol. Why? Should molar conversion be applied or not? | After changes to the module switching from COMET 2 to COMET-FARM, % is now not used and COMET-FARM produces CO2-e directly. | This response does not address the comments or suggestions. | The first comment was do away with mention of percentages. Our response was that we no longer use %.<br><br>The third comment referred to conversion of N2O to CO2 which is also no longer applicable.<br><br>On the second comment, we are applying the best available methods for aggregation of errors. There may be some covariance but if this is sufficient to invalidate the method when used | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | | | | between parcels or between baseline and project then it should not be included as an IPCC option. For A-SMALLSCALE we wanted to stop short of requiring Monte Carlo simulation. | |
| 5-3 | Purpose | You use the term "focal" emissions, but never define what this means. Please provide a definition either here or in a glossary | See response 1-1. We have added to FRAMEWORK-GLLM, section 3.0 Definitions, a definition of Focal Source: the source being evaluated when emission impacts are estimated using T-XANTE in the A-MICROSCALE module. Focal sources include enteric, manure, fertilizer, and fossil fuel emissions, or biotic sequestration. | Accepted | n/a | OK |
| 5-4 | 1.1 | The rationale for using the whole farm model COMET is not presented in the small scale document. The document also does not clearly describe the use of model in non-US contexts and if any constraints exist for its use outside of the US. | The rationale is the quality of the model and ease of use. However, the COMET-FARM can't be used outside the US., since it has only developed for the U.S. | Accepted | n/a | OK |
| 5-5 | 1.1.1 | Where COMET 2.0 gives no estimate of uncertainty (for biotic sequestration or fertilizer emissions) a value of 20% of the estimated amount shall be adopted. | No longer applicable; text deleted. | Accepted | n/a | OK |
| 5-6 | 1.2 | Equation 7. I find the formulation $S\_BIO_{SS} = S\_BIO_{SS,pre\lim} * \left(1 - \left(S\_BIO_{SS,ERROR} - 15\%\right)\right)$ | No longer applicable | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | Easier to read | | | | |
| 5-7 | 1.2 | Equation 3<br><br>The dash in the symbol S-BIO is unfortunate and may lead to confusion. I suggest that it be eliminated.<br><br>Typo: $SSBS_{prelim}$ does not appear in the equation. This should read $S\text{-}BIO_{ss,prelim}$ | Corrected to underscore.<br><br>Corrected | Accepted | n/a | OK |
| 5-8 | 1.2 | Equation 6 and 7<br><br>Here, the term $S\_BIO_{ss,error}$ and $S\_BIO_{ss,prelim}$ appear. This formulation is better than in equation 3 | Agreed. Equation (3) has been corrected. | Accepted | n/a | OK |
| 5-9 | 1.3 | Equation 14. I find the formulation<br><br>$$E\_FERT_{SS} = E\_FERT_{SS,pre\lim} * \left(1 - \left(E\_FERT_{SS,ERROR} - 15\%\right)\right)$$<br><br>Easier to read | No longer applicable | Accepted | n/a | OK |
| 5-10 | 1.3 | Fertilizer emissions derived from COMET 2.0 will be <mark>calculated</mark> for both baseline and project scenario and converted to carbon dioxide equivalents: | No longer applicable | Accepted | n/a | OK |
| 5-11 | 2.0 | Table 2.1. It would be helpful to know what COMET 2.0 requires and the inputs could be added to the table. | This would be very very extensive, so avoided at this time | Okay | n/a | OK |
| 5-12 | 2.0 | Is Section 2.0 'Input Data Sources and Requirements' and Table 2.1 'Data for validation' needed?<br><br>If needed, then exclude reference to 'Table 2.1' (as there is no Table 2.2) | OK | Accepted | n/a | OK |

## 6. A-ENTERIC

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 6-1 | General | Need uniform unit descriptions for all variables throughout the document. For example, BW is bodyweight but elsewhere (Manure) weight is referred to as mass (either would be appropriate, but use only one throughout)<br><br>All equations throughout document: Expressions and units need to be revisited and standardized. For example for Enteric equations '/d' is used. For Manure, equation 18, 'Daily rate…and day-1' are used. | We have attempted to standardize. We use Mass and on day$^{-1}$ for these specific examples. | Accepted | n/a | OK |
| 6-2 | General | Where does the feedlot come into play in this system? Do Dr. Kebreab's equations work for dairy cows in all stages, growing dairy heifers, dry cows, grazing beef cows, grazing heifers and steers and feedlot cattle? If not, it is not clear which production systems apply and which do not. If so, it would be helpful to state that explicitly. | The equations are broadly applicable. A statement was added to 1.1 "The equations are applicable to cows under all production systems." | Accepted | n/a | OK |
| 6-3 | 1.1 | How are these data extrapolated to grazing animals given the data was collected in calorimeters? I assume some of the animals were fed fresh forage in the studies? Again, there needs to be a reference or two. | Citation added to Hristov et al 2013 | Accepted | n/a | OK |
| 6-4 | 1.1 | Typos<br><br>The data were <mark>collected</mark> in the Beltsville<br><br>The baseline shall be dynamic. *<mark>Ex ante</mark> estimate of both baseline and with-project emissions shall be made.* *Ex post* at the time of reporting, baseline and project emissions shall be calculated based on livestock population, climatic conditions <mark>and other factors specific</mark> to the project and time period. | Corrected<br><br>Corrected | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| 6-5 | 1.1 | While I have the utmost respect for Dr. Kebreab, this work needs peer review to be accepted for purposes such as this. Therefore a reference to a published paper **MUST** be included here. | Hristov et al. 2013 now cited. | Accepted | n/a | OK |
| 6-6 | 1.1 | More explanation about why the baseline is dynamic is needed. | Added<br><br>…to allow for changes in livestock numbers | Accepted | n/a | OK |
| 6-7 | 1.2 | Equation 3<br><br>Descriptions – units should read Mcal/day | Now day$^{-1}$ | Accepted | n/a | OK |
| 6-8 | 1.2 | Equation 3<br><br>Where are BW's for baseline and ex ante going to be obtained? Presumably, the baseline will not have a physical representation during the project. | In data source table (section 2.0) we added: "Baseline animal mass and ex-ante estimates of animal mass shall be justified from historical records from the livestock operation, justifiable representative literature or justifiable representative data from neighboring operations." | Accepted | n/a | OK |
| 6-9 | 1.2 | Equation 3 – Description<br><br>$BW_m$ – Is this mean body weight? There should probably be an addition subscript to reference animal type i subscript to the body weight of different animal types in the equations | I think this is unnecessary as summation occurs under a higher parameter | Accepted | n/a | OK |
| 6-10 | 1.2 | Equation. 1, 2 & 3:<br><br>Pr ops and Propx should be standardized;<br><br>A subscript 'm' should come after 'BW' in the equation | Propx in all cases<br><br>Corrected | Accepted | n/a | OK |
| 6- | 1.2 | Equations 1, 2, & 3 | | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 11 | | Pr $op_x$ – Try to correct this in Microsoft Equation so that it is all in the same font, without a space. This problem happens with Microsoft Equation – To correct it select the problem text and change its "style" to text (see file menus) | Corrected | | | |
| 6-12 | 1.2 | Equations 4,5, & 6 <br><br> Descriptions – units should read Mcal/day | Now day$^{-1}$ | Accepted | n/a | OK |
| 6-13 | 1.2 | For transparency, better to provide reference of the data used for the parameters of the equations. | Provided in parameter tables in section 2.0. | Accepted | n/a | OK |
| 6-14 | 1.2 | It will be useful to include other livestock such as buffaloes as they also form significant proportion of dairy, meat, and animal power for agriculture in several countries. | We agree, but unfortunately at present lack appropriate equations for other species. They may be added in a future version of this methodology. | Accepted | n/a | OK |
| 6-15 | 1.3 & 1.4 | These sections are cumbersome. I can try and guess the meaning, but users should not have to guess. Please consider reformulating the previous sections to make it clear to the reader that the same equations are used for both baseline and project. | Hopefully clarified with statement "the same equations given in Section 1.2 are applicable to both the baseline and project cases" | Accepted | n/a | OK |
| 6-16 | 1.6 | See general comment about Monte Carlo simulation | We assume you mean question 1-2. See our response to that question. | Accepted | n/a | OK |
| 6-17 | 1.6 | Typos <br><br> Uncertainty shall be quantified by means of a Monte Carlo simulation. The analysis shall combine uncertainties across each of the categories, for both the baseline and project scenarios. | Corrected | Accepted | n/a | OK |
| 6-18 | 1.6 | Uncertainty—are these also Dr. Kebreab's equations? If not, please reference. | No. These uncertainty equations are common to many GHG offset methodologies. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 6-19 | 1.6.1 | Equation 6<br><br>Simplify the equation to read<br><br>$E\_ENT = E\_ENT_{prelim} * \left(1 - \left(E\_ENT_{ERROR} - 10\%\right)\right)$ | OK | Accepted | n/a | OK |
| 6-20 | 1.6.1 | Since E_ENT can be both positive and negative, why is there no equation to correct for the error when it is negative (see A-FERTLIZER section 1.6.3)<br><br>$E\_ENT = E\_ENT_{prelim} * \left(1 + \left(E\_ENT_{ERROR} - 10\%\right)\right)$ | We have clarified this by noting that Equation 9 is to be used when E_ENT is negative, and providing Equation 10 for use when E_ENT is positive. | Accepted | n/a | OK |
| 6-21 | 2.0 | Add additional subscript to include multiple animal types to BW | We believe unnecessary under the equation formulation. | Accepted | n/a | OK |
| 6-22 | 2.0 | Change units<br><br>Mcal/d to Mcal/day | Now day$^{-1}$ | Accepted | n/a | OK |
| 6-23 | 2.0 | For clarity sake, the need to sum all of the dietary ingredients and their chemical composition might be more explicitly stated other than the summation notation. | This is standard methodology formulation.<br><br>The verifier is responsible for assuring correct application | Accepted | n/a | OK |
| 6-24 | 2.0 | It would be helpful to tell the reader why wet chemistry is required so they choose the correct analysis. Perhaps a paragraph explaining that the key variables needed are only available with wet chemistry and therefore choose EE, NDF, ADF,GE etc. | A GHG methodology explains requirements, but generally not the reasons behind those requirements. | Accepted | n/a | OK |

## 7. A-MANURE

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 7-1 | General | Well done, clear and concise. No other comments on the documentation. | Thank you! | n/a | n/a | |
| 7-2 | 1.0 | More explanation about why the baseline is dynamic is needed. | Added: "to reflect dynamic climate conditions and livestock populations" | Accepted | n/a | OK |
| 7-3 | 1.1 | Equation 2<br><br>This equation assumes full combustion of the captured methane. A more realistic emission factor includes some uncombusted methane and some production of $N_2O$. | We are operating from the assumptions in DAIRY GEM as we interpreted them. Can the reviewer provide a suggested reference for uncombusted methane proportion? | It looks like you are correct. See the IPCC 2006 Guidelines Table 2.2. Granted, the additional emissions are small. I thought it was more. | n/a | OK |
| 7-4 | 1.2 | I assume that equations come from DAIRY GEM. Please confirm and add a reference. | This is stated in section 1.0. A hyperlink to the USDA webpage where the model is available has been added. | Accepted | n/a | OK |
| 7-5 | 1.2 | Equations 4,5, & 6<br><br>There are no units associated with MCF<br><br>The equations to convert °F to °C should not have the outer most brackets | MCF is unitless as we understand it.<br><br>OK | Accepted | n/a | OK |
| 7-6 | 1.2 | Equation 7<br><br>Instead of max(0, 0.13*Tb), I suggest you divide this into two formulas<br><br>a) T < 0 = 0<br>b) T > 0 = your equation | OK. Change implemented. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 7-7 | 1.2 | Equation 10<br><br>$e^{\ln(A)-E/RT}$ is cumbersome. I suggest using $Ae^{-E/RT}$ instead<br><br>The equation to convert °F to °K should read:<br><br>=273+(°F-32)*5/9 | I agree. But for spreadsheet users without great math expertise I think the long form is likely clearer<br><br>OK | I disagree. The equation proposed by the reviewer is clearer. | OK; we have revised to the form suggested by the reviewer. | OK |
| 7-8 | 1.2 | Equation 11<br><br>$VS_{in}$ appears in the equation but it is not defined<br><br>DM is not defined. I assume it means dry matter, but better to be defined at least once | Added. Thank you<br><br>Now defined. | Accepted | n/a | OK |
| 7-9 | 1.2 | Equation 14<br><br>This equation has severe problems as written because $A_{man}/r_{app}$ has the units ha. Should it be $A_{man}*r_{app}$ and $A_{man}$ equals the area over which the manure is applied? | This is directly from DAIRY GEM reference manual eqn. 6.23 p 64 | NOT ACCEPTED.<br><br>I downloaded DAIRYGEM and you are right. That is how the equation in the manual is written.<br><br>**HOWEVER.**<br><br>1. **When you divide Aman (kg) by application rate (kg/ha) the answer is ha** – This equation means that the emissions are | OK. Makes sense. Change made to $A_{man}$ being the area of fields where manure is applied. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | proportional to the area spread not the amount spread. | | |
| | | | | 2. FVA has units mol/kg so this means that the 0.032 has some strange units | | |
| | | | | 3. Aman / rapp equals area where manure is applied. This is easy to measure, why would you calculate it? | | |
| | | | | 4. Everywhere else in the manual they use A for area and M for mass | | |
| | | | | Did you contact the author of DAIRY GEM? I would guess there is a typo in the manual. | | |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | Did you download Sherlock et al 2002? Check the source. | | |
| 7-10 | 1.2 | Equation 12

How is uncollected manure treated? Perhaps a footnote here that indicates where uncollected manure should be accounted for in calculation of CH4 and N2O. On some operations much manure goes uncollected. | Uncollected manure would be covered under alternate equations either in field, barn floor, lot floor etc… | Accepted | n/a | OK |
| 7-11 | 1.2 | Equation 17

What values are used for 'FEC' (fecal production)? | See table in Section 2.0 | Accepted | n/a | OK |
| 7-12 | 1.2 | The module insists on using the methane conversion factor (MCF) based on equations for each system type presented in the module. It is unclear as to how much the values from these equations differ from the ones used by the IPCC, which outline values for the Methane Correction Factor depending on the waste management treatment system.

It is also useful to have reference sources for the equations so that projects can be informed of the basis/source of the various equations. | All from DAIRY GEM as explained in 1.0 | Accepted | n/a | OK |
| 7-13 | 1.3 | Equation 22

Typo in the description E_MAN~prelim~ | Corrected. | Accepted | n/a | OK |
| 7-14 | 1.3 | Equation 23

Simplify the equation to read

$E\_MAN = E\_MAN_{pre\lim} * \left(1 - \left(E\_MAN_{ERROR} - 10\%\right)\right)$ | Change made (now equation 24). | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 7-15 | 1.3 | Since E_MAN can be both positive and negative, why is there no equation to correct for the error when it is negative (see A-FERTLIZER section 1.6.3) $$E\_MAN = E\_MAN_{pre\lim} * \left(1 + \left(E\_MAN_{ERROR} - 10\%\right)\right)$$ | We have clarified this by noting that Equation 24 is to be used when E_MAN is negative, and providing Equation 25 for use when E_MAN is positive. | Accepted | n/a | OK |
| 7-16 | 1.3 | Equation 18 Description – $E_{N2O,floor}$ and $E_{N2O,man}$ should have the units kg N2O day$^{-1}$ | Corrected. | Accepted | n/a | OK |
| 7-17 | 1.3 | Why are no calculations of N2O emissions from pasture (direct manure deposition) and manure land application? I believe DairyGEM calculates these as being greater than emissions from barns. | Oversight. Thank you. Now included | Accepted | n/a | OK |
| 7-18 | 1.3 | N excretion values are "way off" please see the attached publication for more recent values. | N excretion values are from DAIRY GEM. Can the reviewer help us with alternate numbers we should use? | The publication was provided in the earlier correspondence | I do not understand what the reviewer seeks to have changed. We do not put in numbers for N excretion. Instead we require users to come up with these themselves either from the literature or from direct measurement. We have numbers for emissions from a given excretion but the paper supplied does not give alternatives to these…. | |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 7-19 | 1.4 | Equation 21<br><br>The shorthand notation BSL/P is confusing | Now separate equations 22a and 22b for baseline BSL and project P. | Accepted | n/a | OK |
| 7-20 | 1.4.1 | How should the Monte Carlo analysis be done? Who will do it? Who will validate it? | The methodology is not prescriptive on that level. Validation will be by the VVB. | See my previous response to this, in comment 1-2. | We are requiring something more than a propagation of errors. This would be a simulation as per IPCC. Verification of adequacy of methods employed by projects will be by VVB | OK (see note in 1-2) |
| 7-21 | 1.4.1 | Why does error sometimes use 90% CI & 10% correction, and other times 95% and 15%? Please explain the rationale. | ACR has chosen the 90/10 rule in the *ACR Standard,* but COMET models spit out 95%. | Then specify that wherever necessary, the rule will be whatever COMET outputs. Otherwise, if COMET changes, the protocol will not work anymore. | Not applicable to this module. But comment added to SMALLSCALE. | OK |
| 7-22 | 2.0 | (1)  'Mass of N excreted' is to be 'Derived from laboratory analysis of feces or literature where justifiable'. The mass (kg) of feces would also be required.<br>(2)  'Fraction of VS in total solids' Are these units correct? Please double check all descriptions and units.<br>(3) 'Data Requirements', 'Collection Procedures', 'Source of Data' etc. left blank in most cases.  Will these be filled in later? Something should be filled in (e.g., 'not applicable', | 1)  Added: "and sampling of fecal mass"<br><br>2)  I believe so<br><br>3)  Added | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | 'not required', 'refer to…') | | | | |
| 7-23 | 2.1 | Depending on the answer to the problem with equation 14, $A_{man}$ needs to be checked | Follows Dairy GEM. | NOT ACCEPTED | Change made to $A_{man}$ being the area of fields where manure is applied. | OK |

## 8.  A-FERTILIZER

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 8-1 | Applic. Conditions | The module will be useful. As the sources used in other countries collected on farm aide guidance on the data sources the methodology. | Thank you | n/a | n/a | |
| 8-2 | General | The heading numbering needs to be checked. Heading 1.2 appears twice: Once with text *Quantification*, once with text *Fertilizer production emissions*.<br><br>The following comments are referenced using the original numbering system | Corrected | Accepted | n/a | OK |
| 8-3 | 1.0 | Typos<br><br>The baseline shall be dynamic. *Ex ante* estimate of both baseline and with-project emissions shall be made. *Ex post* at the time of reporting, baseline and project emissions shall be calculated based on livestock population, climatic conditions and other factors specific to the project and time period. | Corrected | Accepted | n/a | OK |
| 8-4 | 1.0 | More explanation about why the baseline is dynamic is needed. | Inserted: "dynamic in order to capture variation resulting from actual climate conditions" | Accepted | n/a | OK |
| 8-5 | 1.1 | The reference for the IPCC AFOLU 2006 guidelines should be added for ease of access. | Added | Accepted | n/a | OK |
| 8-6 | 1.1 | Typo<br><br>i)     The model is validated for at least 50% of the total project area relevant to fertilizer emissions where the project area covers up to 50,000 ha; or at least 75% of the total project area where project area relevant to fertilizer | Corrected using the suggested rewording. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | ==emissions== covers greater than 50,000 ha; and<br><br>Or use the following suggested rewording<br><br>The model is validated for at least 50% of the total project area relevant to fertilizer ==application== where the project area covers up to 50,000 ha; or at least 75% of the total project area where project area relevant to fertilizer ==application== covers greater than 50,000 ha; and… | | | | |
| 8-7 | 1.1 | *Emissions resulting from fertilizer application shall be estimated using a process model. To be applicable, the model shall have been accepted in scientific publications*<br><br>Does this mean a process model eligible for use needs to be first referenced in a peer reviewed scientific publications? Please clarify. | Yes. clarified | Accepted<br><br>When I proposed soil organic carbon models to the VCS, they added that the models needed to be shown in peer-reviewed publications to be applicable in the region. Do you need to add a similar text (or is a model developed in India applicable in the U.S.)? An open question – not a critique<br><br>Location is covered in 8-12 below | n/a | OK |
| 8-8 | 1.1 | Some guidance on data sources of the input parameters at the end of the module will be useful. | This isn't possible without specifying the models that are to be used. We didn't want to prescribe the model(s), but rather | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | include criteria (in 1.1) that must be met for a model to be eligible to use. | | | | |
| 8-9 | 1.2 (Fertilizer production emissions) | Equation 6<br><br>Where application rate is in pounds per acres convert to metric tonnes per hectare by multiplying by 0.0014 | OK | Accepted | n/a | OK |
| 8-10 | 1.2 (Fertilizer production emissions) | Please provide a reference for the conservative emission factor for ammonia production | The reference is provided (2006 IPCC Guidelines for National Greenhouse Gas Inventories). | Accepted | n/a | OK |
| 8-11 | 1.2 (Quantificati on) | Equations 1, 2, 3, & 4<br><br>Strictly speaking since the emissions are time varying there should be a subscript for time OR maybe it should be stated that the time subscript has been omitted.<br><br>Description of $GHG_{BSL\_N2O,E,I}$ and $GHG_{P\_N2O,E,I}$ is repeated. | Corrected<br><br><br>Corrected | Accepted | n/a | OK |
| 8-12 | 1.2.1 | *The model shall be calibrated to the project location*<br><br>If this means a true calibration, it would be too expensive and difficult. Local calibration requires direct measurements of inputs, conditions and outputs at the location. | Added "using pre-existing data and factors appropriate to the climate zone/region and edaphic conditions" | Methodologies like the present one are extremely complicated, even if everything is clear. Unfortunately, not everything is clear. Thus, there is a need to provide examples and guidance; and to state that some of the required steps are open to interpretation by the user. In the | You are right.  We are not requiring a high level scientific study to alter the model so that it fits the region. Calibration in this sense is much more putting in necessary site or region specific data.<br><br>I don't think "if data are available" is necessarily true. The model has to be correctly | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | | case of calibration, the text gives the impression that a strict calibration is necessary. To an engineer, calibration will have a very specific meaning. To a statistician, the term will also have a very specific meaning. The problem is that those meanings are likely to differ. I honestly do not know what is required here. Is a "real" calibration necessary or does the statement mean that the model has to use parameter estimates and inputs that are reasonable for the region? The statement about calibration appears to be strict, but the response to the original comment appears to indicate that the "calibration" required is a more general adaptation of | parameterized.<br><br>I have changed the word from calibrated to applied in the hope that this removes the uncertainty. | |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | | | the model to the region, if data are available. | | |
| 8-13 | 1.2.1 | Equation 1, 2, 3 & 4<br><br>A description of $GHG_{P\_N2O,E}$ is not included (actually a description of $GHG_{P\_N2O,E,I}$ appears twice). Remove the subscript in the second occurrence | Corrected | Accepted | n/a | OK |
| 8-14 | 1.6.2 | *If present these shall be used for modelling values across the 90% confidence interval values of the input data.*<br><br>The meaning of this is not clear. Certainly, Monte Carlo Is not the same as applying the model to the CI extremes of the input data. | The intent here was: if the model includes Monte Carlo simulation, then use it. Edited to "Where models include such simulations, these simulations shall be used" | Accepted | n/a | OK |
| 8-15 | 1.6.2 | Uncertainty shall be quantified by means of a Monte Carlo simulation. Process models can include Monte Carlo analysis procedures. | OK | Accepted | n/a | OK |
| 8-16 | 1.6.3 | Equation 11<br><br>   1) Move the following text to before the equation<br><br>*Where E_FERT is negative (decrease in fertilizer use by the project)*<br><br>   2) Simplify the equation to<br><br>$E\_FERT = E\_FERT_{pre\lim} * \left(1 - \left(E\_FERT_{ERROR} - 10\%\right)\right)$ | Left the text placement as is for consistency with other modules.<br><br><br>Corrected | Accepted | n/a | OK |
| 8-17 | 1.6.3. | Equation 12<br><br>   1) Move the following text to before the equation<br><br>*Where E_FERT is positive (increase in fertilizer use by the project).*<br><br>   2) Simplify the equation to | Left the text placement as is for consistency with other modules.<br><br><br>Corrected | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | $E\_FERT = E\_FERT_{pre\,\lim} * \left(1 + \left(E\_FERT_{ERROR} - 10\%\right)\right)$ | | | | |
| 8-18 | 1.61 | References to use to start with to plan project-specific measurements including appropriate guidelines for equipment range and sensitivity as well as needed ancillary measurements. | We are unclear on the meaning of this comment. Could the reviewer clarify? | Suggest adding the references to the default values.<br><br>Also suggest specifying appropriate guidelines for equipment range and sensitivity. If an N2O analysis was available and used to make a measurement is any method ok? Should there be a sensitivity threshold to insure the robustness of those measurements? Is there an acceptable error bound? 2%? 20%<br><br>Also indicate what ancillary values are needed to replace specific default inputs with project specific inputs. Should tillage, fertilizer application rate and rainfall be necessary if N2O is measured or are | Again not knowing precisely the inputs needed by the process model selected, we cannot easily set criteria. This section is about good practice guidance in as far such things exist in a methodology. We are just suggesting uncertainty be considered early instead of after everything is said and done and it is too late to have an impact. | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | | | default values acceptable for those ancillary factors? | | |
| 8-19 | 2.0 | Ass outputs needed to the table. It is in the text but it would make the table more usable if it were complete. | We are unclear on the meaning of this comment. Could the reviewer clarify? | Add outputs needed to the table. It is in the text but it would make the table more usable if it were complete. Making the tables complete rather than going back and forth to the text makes the process easier. | The problem is that the specific parameters in the tables would be determined by the selected model and we are not specifying models. A bad chicken and egg situation that precludes us from including complete parameter tables. | OK |
| 8-20 | 2.0 | *Proponents must retain a conservative approach: that is, if different values for a parameter are equally plausible, a value that does not lead to overestimation of net GHG emissions must be selected.* This seems counter to the conservative approach. I thought that the conservative approach should always tend to yield the least favourable case: <br> a) greater net emissions into the atmosphere <br> b) greater project emissions <br> c) smaller baseline emissions <br> This wording only appears in this module. It should either appear in all modules or in the Framework only. Please check wording in all modules | Edited to say does not lead to an overestimation in emission reductions Copied to other modules | Accepted | n/a | OK |

## 9. A-BIOTIC

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 9-1 | General | Key Input Data: use something other than '>' as a bullet, this symbol designates 'greater than'<br><br>Purpose: revise to read 'To estimate carbon sequestration and net CO2 emission reductions….' | Change made | Accepted | n/a | OK |
| 9-2 | General | The titles of sections and the organization are not clear. For example, the baseline has already been considered in section 1.2.2 but then there is a section (1.3) specifically for it. Improvement of organization will facilitate the use of the document. | Baseline section (1.3) now "baseline summation" and following section project summation. | Accepted | n/a | OK |
| 9-3 | 1.0 | Link to "Tool for estimation of stocks in carbon pools and emissions from emission sources" should be added. | Added | Accepted | n/a | OK |
| 9-4 | 1.1. | Does this mean models need to be referenced in peer reviewed publication or any scientific publication/report? Useful to clarify the criteria that models need to meet for use in the projects under the methodology. | Clarified | Accepted | n/a | OK |
| 9-5 | 1.2.1 | It would be better to combine the first two paragraphs in this section to avoid repetition. | We chose to have a little repetition to maintain greatest clarity. | Accepted | n/a | OK |
| 9-6 | 1.2.2 | Equation 1<br><br>The terms $C_{AB\_tree}$, $C_{BB\_tree}$, $C_{AB\_nontree}$, $C_{AB\_nontree}$ should probably have an additional subscript – BSL, or at the beginning of this section you should include a sentence such as<br><br>CPES is used to calculate both baseline and project carbon stocks. In equation 1 the outputs from CPES using baseline parameterization are used. In equation 2 the outputs from CPES using project | Change made. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| | | parameterization are used. | | | | |
| 9-7 | 1.2.2 | Equation 2<br><br>See comment for equation 1.<br><br>The terms $C_{AB\_tree}$, $C_{BB\_tree}$, $C_{AB\_nontree}$, $C_{AB\_nontree}$ should probably have an additional subscript – PRJ | Text added as suggested above | Accepted | n/a | OK |
| 9-8 | 1.3 | Equation 3<br><br>In the description<br><br>$SOC_{BSL,i}$ – Lower case i<br><br>$TS_{BSL,i}$ – Lower case i | OK | Accepted | n/a | OK |
| 9-9 | 1.4 | What is meant by a "conservative" approach. This is a loose definition without some error bounds or some guidance of what does "conservative" mean. | I think conservative is fairly well understood in this context. It means that where more than one approach is possible, the approach that would underestimate net GHG emission reductions must be chosen. | Accepted | n/a | OK |
| 9-10 | 1.6 | Uncertainty shall be quantified by means of a Monte Carlo simulation. If this is incorporated in the model this facet shall be used and reported. | OK | Accepted | n/a | OK |
| 9-11 | 1.6.1 | Terrific addition of accepted protocols. The same info is needed in other documentation. | Thank you | n/a | n/a | |
| 9-12 | 1.6.1 | Equation 6<br><br>Simplify the equation to read<br><br>$S\_BIO = S\_BIO_{pre\lim} * \left(1 - \left(S\_BIO_{ERROR} - 10\%\right)\right)$ | OK, suggested change made. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| 9-13 | 1.6.1 | Since S_BIO could be both positive and negative (i.e. an emission), you should probably include the correction for the case where there is a biotic emission<br><br>$$S\_BIO = S\_BIO_{pre\lim} * \left(1 + \left(S\_BIO_{ERROR} - 10\%\right)\right)$$ | We have clarified this by noting that Equation 6 is to be used when S_BIO is positive, and providing Equation 7 for use when S_BIO is negative. | Accepted | n/a | OK |
| 9-14 | 1.7 | In the text<br><br>*The half-width of the 90% confidence interval for the samples taken must be equal to 20% or less of <mark>the mean</mark>, where this criterion is not met additional samples must be taken.*<br><br>Is this the mean of stratum I? Please to clarify | I think the text is clear that "a single randomly selected stratum" is sampled. | Accepted | n/a | OK |
| 9-15 | 1.7 | In the text<br><br>*Where the estimate of stock does not conform users must either take additional samples to justify the model return, or must re-run the model altering input parameters to achieve a new conforming estimate for project*<br><br>Guidance on procedures to be followed in revising the input parameters needs to be included to avoid subjectivity in the model re-runs. | Here it is not really possible to give guidance, since we are not specifying the model. Users will have to justify all choices made to the VVB. | There are several responses indicating that the issue raised has to be resolved by the VVB. I am a bit concerned that too much is left to be decided or resolved by the VVB. I am not familiar with the rules that VVB's have to follow. Make sure that the protocol is not weakened by leaving to many important decisions up to the VVB. | We take your concern and are trying to do all we can to minimize things at the VVB discretion. In the end though, VVBs are experts and must have capability in the area being verified. | OK |
| 9- | 2.0 | Again, consider adding needed outputs to the table to increase its | Not possible when we are not specifying the model to be used, | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 16 | | usefulness. | only the criteria for acceptability of a model (see 1.1). | | | |
| 9-17 | 2.0 | It would be useful to provide guidance on input data and sources as well as procedures for ensuring QA/QC of data so that verifier can review and cross check input data details. | Not possible when we are not specifying the model to be used. Project Proponent must specify in the GHG Project Plan the precise approach, and it is the VVB's responsibility to ensure data and method appropriateness. | Accepted | n/a | OK |

**10. L-GLLM**

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 10-1 | Applic. Conditions | Wording<br><br>The module is required where the project leads to a decrease in output relative to the baseline case greater than 3%.<br><br>The use of output/yield is confusing. Should it be output? | Yes. Instances of "output/yield" have been changed to "output". | Accepted | n/a | OK |
| 10-2 | Applic. Conditions | Is the 3% per year, total?<br><br>How, why was 3% chosen?<br><br>The 3% threshold for market effects leakage is below the significance threshold as such small changes in product output may not have market impacts. It may be better increase the threshold for change in output for triggering the estimation of market leakage. | The 3% is per reporting period. The output values must be revised upon each verification. This has been clarified in the text.<br><br>3% is consistent with ACR's threshold for *de minimis* GHG pools or sources, which may be excluded from accounting provided the sum of all pools and sources excluded does not exceed 3% of the *ex ante* estimate of net GHG reductions. See response 2-9. | Accepted | n/a | OK |
| 10-3 | General | The concept is good. I have little experience with yields from grazing systems but I wonder if there may be a variation of 3% caused by factors such as weather (it certainly would if the module were for crops). Does this need to be addressed and corrected for? | We agree that projects should not be penalized for output reductions caused by weather. However, output variations caused by weather could be both higher and lower than average. As such, we feel average conditions are reasonable over the period of time being considered in GLLM projects. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | | Note that activity shifting leakage is only accounted for under certain conditions (i.e. production changes outside the project boundaries). Furthermore, the baseline output value is based on average output for the 5 years prior to project start date; or if 5 years of historic data is unavailable, based on common practice.  This accounts/corrects for any extreme annual variation in the baseline.<br><br>ACR does have a procedure in its methodology *Voluntary Emission Reductions in Rice Management Systems* for normalizing yield against county-level yield data to separate the effects of weather and other variables from yield effects of the project activity.[1] We will evaluate whether this procedure should be migrated to the GLLM methodology. | | | |
| 10-4 | 1.0 | Consider rewording<br><br><mark>Estimate and justify output/yield in the baseline case and monitor</mark> | This has been reworded for clarity. | Accepted | n/a | OK |

---

[1] See http://americancarbonregistry.org/carbon-accounting/carbon-accounting/emission-reductions-in-rice-management-systems, Parent Methodology, section 12.1.

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | <mark>output/yield in the project case.</mark><br><br>1. Where baseline output exceeds project output by >3% and the baseline land owner/user purchases new fields, brings new fields into production, increases livestock population outside the project boundaries, or is displaced from the project area, activity shifting leakage shall be determined per section 2.0.<br>2. Where baseline output exceeds project output by >3%, market-effects leakage shall be determined per section 3.0. <mark>Market-effects leakage may be positive or positive</mark> | | | | |
| 10-5 | 1.0 | Add text<br><br>Activity shifting and market effects leakage are mostly relevant for large scale projects and to some extent for small projects but not to microscale projects. | We do not feel that this distinction is appropriate. The scale of an emission source does not dictate the need for leakage accounting. Rather, the need for leakage accounting is dependent on whether or not the level of production has changed from baseline to project under any scale. A small scale project can potentially have very high leakage rates whereas a large scale project may not have any. | OK, but this probably requires more thinking for future versions. Certainly, at equal "leakage rates" small projects have less leakage than large ones. | n/a | OK |
| 10-6 | 2.0 | Typo<br><br>Where possible, production should be reported; where this is not possible, then common practice should be used to determine per unit area / per head emissions and estimates of numbers of <mark>animals</mark>. | Change made. | Accepted | n/a | OK |
| 10-7 | 2.0 | The assumption with regard to the assessment of activity shifting is that project entity has full information on the activity shifting. | In an aggregated project, each Project Participant (baseline | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| | | However, it may not be so when activities of several project entities are shifted, in which case, sampling may be required. | landowner) would be responsible for monitoring and providing information about activity shifting within their lands to the Project Proponent (aggregator).  Just as the Project Proponent would need to have access to the information necessary to quantify GHG emissions for each aggregated parcel, we feel that they should also be able to gather the necessary information regarding activity shifting. | | | |
| 10-8 | 2.0 | 1. Micro scale activities can be excluded from leakage assessment as the activity shifting associated with such activities is not likely to have significant impact.<br><br>2. For small scale projects, a default discount factor could be applied when certain criteria for activity displacement are met. | We do not feel that it is necessary to create unique conditions under which leakage assessments are conducted according to project scale. The scale of an emission source does not dictate the need for leakage accounting.  Rather, the need for leakage accounting is dependent on whether or not the level of production has changed from baseline to project under any scale. A small scale project can potentially have very high leakage rates whereas a large scale project may not have any.  In this methodology, the scales are defined by emissions sources, not production output. | OK. See above. | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|------|-----------|----------|-----------|----------|-------|
| 10-9 | 3.0 | 1. Microscale activities should be excluded from the assessment of market leakage.<br><br>2. Leakage assessment for small scale activities should be simplified.<br><br>3. Market leakage assessment should be limited to large scale projects provided certain threshold higher than currently defined 3% is met. | Same response as above.<br><br>On third point, see response to comment 10-2. | Accepted | n/a | OK |
| 10-10 | 3.1 | Typo<br><br>Price elasticities of supply and demand for the dairy and beef sectors have been derived and published in several peer-reviewed economic studies (e.g., Tvedt et al. 1991) and can be used to estimate market-effects leakage, as described below. The leakage factor for supply changes is greater when, for a given sector, there is high price elasticity of supply and low price elasticity of demand. This means that a percentage <mark>increase</mark> in price will induce a greater percentage increase in supply and a lesser percentage decrease in quantity demanded. In the long-term, this may be the case for agriculture, as the price elasticity of supply is generally high and the price elasticity of demand for staple foods tends to be very low.<br><br>Comment<br><br>This is outside my area of expertise, so I cannot evaluate it completely. However, the explanation seems convoluted. Moreover, it seems to ignore the fact that the driver of potential leakage is reduced production (supply), not change in price. | "percentage change" changed to "percentage increase" in the highlighted sentence.<br><br>The higher the elasticity the greater effect price will have on either supply or demand. So in the case where there is a high price elasticity of supply and low price elasticity of demand, an equal change in price will have a greater influence on supply than on demand. So while it is correct that the driver of potential market effects leakage is reduced supply, prices and price elasticity are important since they may affect supply more than demand. | Accepted | n/a | OK |
| 10-11 | 3.2 | Define $E_D$ and $E_S$ in the paragraph when it is first used. They are defined later in the next table. | Edit made. | Accepted | n/a | OK |
| 10- | 3.3 | Typos | Corrected. | Accepted | n/a | OK |

| # | Sec. | 1st Review | Response | 2nd Review | Response | Final |
|---|---|---|---|---|---|---|
| 12 | | Consistency of E-ME v E_ME and E-LK v E_LK | | | | |
| 10-13 | 3.3 | Equation 2<br><br>The use of lbs/kg, gal/l is confusing. Consider rewording to<br><br>Project output at the time t in appropriate units of production (for example, lbs or kg of animal, or gal or liters of milk)<br><br>Similarly for the baseline output description<br><br>Similarly for the baseline emissions per unit output | Edits made. | Accepted | n/a | OK |