Identifying General and Specific Risks Inherent in Project Development and Credit Generation from N_2O Reduction Methodologies

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Introduction

The Coalition on Agricultural Greenhouses Gases (C-AGG) is a multi-stakeholder coalition fostering a fact-based discourse on the development and adoption of voluntary incentives to reduce GHG emissions from the agricultural sector. C-AGG seeks to promote agreement on and development of the proper incentives, tools, and information to enable the agricultural sector to find value in GHG emission reductions and sequestration opportunities that provide mutual benefits to agricultural producers and to society, at a scale that matters. One of the strategies for achieving this mission is through the development and inclusion of agricultural emission reduction offsets (carbon credits) in all emission trading markets.

To date, the generation and use of carbon offsets from agriculture projects in trading markets has been minimal due to soft market demand for offsets resulting in a low price signal to project developers, higher risks associated with implementing agricultural projects, and minimal outreach and education to the most important stakeholders in the agricultural sector, the producers. C-AGG's Project Implementation Working Group (WG) formed in late 2014 to develop tools, training materials, and other documentation that would address these project implementation barriers to move agricultural carbon offset project development forward in the United States. Given WG members' experiences implementing projects, their understanding of the challenges associated with these types of projects, and the large offset potential associated with these projects, the WG chose to focus its initial efforts on developing a framework for identifying agriculture offset project risks using the risks associated with implementing nitrous oxide (N_2O) reduction projects as a case study.

The following is a technical document developed specifically for project developers[1] and verifiers[2] that is intended to clarify and streamline the process of identifying risks associated with N_2O reduction project development and implementation, and to help these two parties better understand the framework upon which project and verification documentation is developed. The goal of the document is to provide project developers, including their field agents and participating farmers, and verifiers with a nuanced understanding of N_2O methodology risks to help streamline the project life-cycle, reduce project implementation costs, and increase uptake of these methodologies. This document will be

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[1] Project developers can be agricultural producers or entities that aggregate multiple farms/farmers into one or more projects. The term "project developer" may be synonymous with "project proponent" (PP), "offset project operator" (OPO) or "authorized project designee" (APD), terms which are used in various offset markets and methodologies.

[2] Please note that the term "verification" or "verifier" may be used interchangeably with "validation" or "validator" for the sake of simplicity, however it should be clear that projects will have to undergo both validation (process by which the validation body will review the project's baseline assumptions and monitoring parameters) and verification (process by which the verification body reviews the "on-the-ground" conditions and ensures that GHG emission reductions claimed are real, accurate and transparent). Validation and verification can occur simultaneously or separately by a single Validation/Verification Body (VVB).

continually updated and improved based upon the experiences of project developers and verifiers using these methodologies. This document will be used as the foundation for future training materials to be developed by the workgroup that will be targeted at improving project developers and verifiers understanding of how the protocol is implemented and verified to make projects economically viable. If this framework for risk-assessment and training is successful, the WG will consider adapting it for use with other agriculture methodologies.

Objectives

PROJECT DEVELOPERS

The project developer is responsible for all risks associated with project design and implementation. A project developer is responsible for the emission reduction assertion made at the conclusion of each project reporting period and cannot hold a producer liable for misstatements that are the result of errors and/or omissions in the project developer's systems and processes. Therefore, a project developer's main responsibilities include the development, use, and documentation of business processes and system controls that mitigate the chance of an error or errors due to material misstatements[3] or instances of non-conformance[4] which could result in a negative verification opinion[5] or invalidation of credits. After completion of each reporting period of a project, the project developer's documentation is used by a verifier to assess how well a project's procedures address various risk parameters.

A project developer's level of responsibility makes them vulnerable to many sources of risk during the development of a project. Identifying, fully understanding, and developing mitigation plans to control for these risks can be a very cumbersome and time consuming process that is often a significant barrier to entry. To help lower the barrier to entry, this document helps with the first step in this risk mitigation process: the identification of project development risk parameters. Project developers can use the framework provided and the risk parameters identified to develop mitigation strategies that control for the risks that will be encountered during the project development process. While not all risks can be completely mitigated, all should be considered before implementing a project since verifiers will consider the significance of these risks when creating their verification sampling plan.

This document has not been developed as a resource to guide project developers through every step of the project implementation process and does not provide advice on the development of specific risk controls or processes that a project developer should put in place to manage these risks. This is considered proprietary and therefore outside the scope of this document, which has been designed in a pre-competitive space.

VERIFIERS

Given the limited number of agriculture projects developed for voluntary carbon markets, specifically those using the N_2O emission reduction methodologies, verifiers have limited experience evaluating the conformance with the methodologies including the identification and categorization of the project risks.

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[3] A discrepancy, omission, or misreporting, or all three, identified in the course of offset verification services that leads an offset verification team to believe the project report contains errors resulting in an overstatement of the reported total GHG emission reductions or GHG removal enhancements greater than 5%.

[4] A deviation from the requirements put forth in a carbon credit generation methodology.

[5] An inability of the verifier to state that stated emission reductions are materially correct.

While project developers will be responsible for mitigating risks throughout project development (i.e. planning phase, implementation phase, and verification phase), verifiers need to understand the project risk parameters and the project developer's potential risks controls to better inform their sampling plan development.

During the audit process, the verification team will review and perform a risk assessment of the project's documentation and management systems, which allows the verifier to focus on risk parameters that will present the greatest potential for error or misstatement. The results of the risk assessment are then used to develop the verification sampling plan which highlights the aspects of the project that will require further exploration. The verification team assigns one of three different risk types to the risk parameters identified for further exploration in the sampling plan: inherent, control and detection. The different types of risks[6] are defined as:

1. **Inherent risks** - the innate risk of a material misstatement[7] occurring such as the uncertainty associated with modeling, calculations, etc. An example of this would be the incorrect transcription of handwritten data to an Excel spreadsheet.
2. **Control risks** - the risk that the project proponents will not prevent or detect a non-conformance from occurring due to a lack of proper data management, project design, etc. For instance, project staff have not been given sufficient training in running the DeNitrification-DeComposition (DNDC) model[8] which leads to a material overstatement of emission reductions. [9]
3. **Detection risks** - the risk that the validator or verifier will not detect any material discrepancy that has not been corrected by the controls of the organization or GHG project. For example, there is an error in the calculations greater than 5% that is not rectified during the audit which leads to an over-issuance of tons.

This document does not provide verifiers with recommendations on how to design a sampling plan to assess and classify risks for an N_2O reduction project since development of those plans are considered proprietary and therefore outside the scope of this document, which has been designed in a pre-competitive space.

Methodologies Investigated

Over the past 10 years, the American Carbon Registry (ACR), Climate Action Reserve (CAR), and Verified Carbon Standard (VCS) have developed and approved 15 methodologies to quantify GHG emissions reductions from changes in agricultural practices. This working group focused on methodologies to reduce emissions of nitrous oxides (N_2O) from agriculture, due to the carbon offset potential for these methodologies in the market.

While 4 methodologies for N_2O reductions have been completed and approved in the past 5 years in the United States, only one project has successfully generated tons. The working group hypothesized that

[6] ISO 14064-3:2006, Section 4.4.1
[7] A material misstatement is typically defined as the aggregate of misreporting, discrepancies, omissions errors identified during validation or verification that results in greater than a ±5% error. A material misstatement that cannot be corrected will not be issued offset credits and will most likely be issued a negative validation or verification statement.
[8] The DNDC model is a computer simulation model of carbon and nitrogen biogeochemistry in agro-ecosystems.
[9] C-AGG developed an uncertainty white paper that explains some of these risks and mitigation opportunities in more detail. It can be found on C-AGG's Resources page.

numerous factors have contributed to this lack of uptake, including: methodological complexity, high project implementation costs and risks, limited offset demand, limited or low price signals, and market uncertainty. C-AGG participants and stakeholders have theorized that project developers may be more willing to utilize these methodologies if the specific project development risks are better understood and articulated in advance of undertaking a project.

Therefore, C-AGG's Project Implementation Working Group (WG) focused its efforts on documenting the specific project development risks for The American Carbon Registry's (ACR) nitrogen management methodologies with which the group had extensive expertise: the Methodology for Quantifying Nitrous Oxide (N_2O) Emissions Reductions from Reduced Use of Nitrogen Fertilizer on Agricultural Crops ("Rate Reduction Methodology[10]"). While the risk parameters in this document identify the specific risks for this ACR methodology, some of the risks parameters presented are generic and can apply to all nutrient management methodologies for the voluntary and compliance markets including ACR's Methodology for N_2O Emissions Reductions from Changes in Fertilizer Management[11] ("DNDC Methodology"), the Climate Action Reserve's (CAR) Nitrogen Management Project Methodology, the Verified Carbon Standard's (VCS) Quantifying N_2O Emissions Reductions in Agricultural Crops through Nitrogen Fertilizer Rate Reduction methodology, and Alberta's Quantification Methodology for Agricultural Nitrous Oxide Emission Reductions. To fully understand the extent of the overlapping risks across all methodologies these additional methodologies would need to be reviewed in more detail, which was considered outside the scope of this case study.

Identification of Risk Parameters

The risk parameters outlined in the section below highlight generic and specific areas of concern for project developers and verifiers during the development and verification of N_2O emissions reduction projects. Figure 1 provides a high-level overview of the risks identified in this document for each stage of project development and provides a visual representation of the framework for how the risks are organized and discussed in this section.

As previously noted, project developers are responsible for mitigating all risks presented, including verification risks, which can be (at least partially) controlled by the project developer through the selection of a verification entity that has familiarity with the type of project implemented. While the On-Farm risk parameters seem beyond the scope of a project developer's responsibilities, working with farmers to control for these risks does fall to the project developer. While verifiers are not responsible for mitigating any of the risks provided, they should view the list of risks as a framework for developing their verification sampling plan. Additionally, verifiers could help streamline the project implementation process by understanding and mitigating the Verification Risk parameters even though the ultimate responsibility for these risks does fall to the project developer.

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[10] Also, referred to as the Michigan State University – Electric Power Research Institute (MSU-EPRI) methodology

[11] For example, the DNDC Methodology would introduce additional specific risks, such as field stratification (Section 4.3), model calibration/validation (Section 4.8.3), and additional input parameters (Section 5.2).

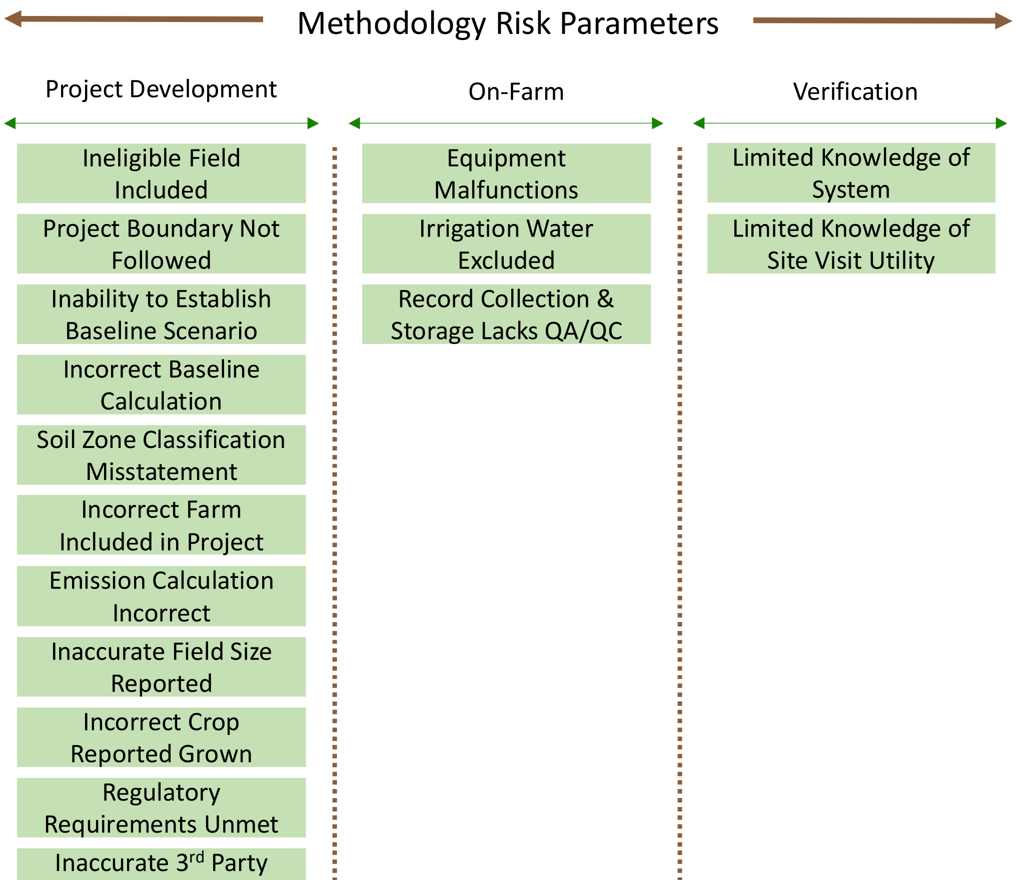

Figure 1 Summary of risk parameters for ACR's methodologies

Project Development Risk Parameters

I. Eligibility Risk

RISK: An ineligible field on a farm is permitted to participate in an aggregated project.

An ineligible field would be a project area that did not adhere to the following eligibility requirements:

RISK: The field has not been cultivated for a minimum of 5 years prior to the project start date.

RISK: Fertilizer nitrogen sources reported are not correct or accurate.

RISK: Fertilizer nitrogen management practices are not implemented according to the methodology.

RISK: The additional fertilizer is not compared against the same crop type on the same land area.

RISK: An ineligible pathway for N_2O emissions is included in the project.

RISK: Best management practices have not been adhered to within the project boundary.

RISK: The project was not undertaken in an eligible geography (e.g., outside the US or in incorrect growing regions).

RISK: Project category 1 (from Section 2.5 of the Rate Reduction Methodology) is applied to the project.

RISK: The actual cropping area does not correspond with the reported cropping area.

RISK: The soil type reported or defined through publicly available data sources is not accurate for the project boundaries.

RISK: The crop is grown on fields consisting of organic soils (Histosols), as defined by the World Reference Base for Soil Resources (FAO 2006),[12] which are ineligible.

RISK: Project activities occur on fields for which operators do not adhere to best management practices as they relate to application of synthetic and organic N fertilizer formulation, and dates and methods of application. This also presents the risk of the project plan being out of conformance with the ACR standard.

II. Project Boundary Risk

RISK: The spatial boundary is outside of the project boundary and includes emissions from beyond the site of fertilizer application.

RISK: The temporal boundary used to develop the project either excludes the first application of nitrogen or includes nitrogen applications for additional cropping years based on the methodology's requirement to report on a 12-month period.[13]

III. Baseline Scenario Selection Risk

RISK: Prior to calculating an emission reduction a project developer must determine the *Business As Usual* baseline condition for each participating farm. In some cases this may involve selection from several approved methods for determining a baseline as set forth in a methodology.

RISK: The field of the project boundary has not been in production for the prerequisite time period, or has improperly reported the crop rotation.

RISK: Organics were applied without a record of rate, date and N content.

RISK: Primary evidence (i.e. farmers' records) of input data is not available.

IV. Baseline Calculation Error Risk

RISK: The baseline calculations are materially incorrect.

RISK: Baseline data is incorrect. (May come from a wide variety of sources and need to be interpreted before being used for the calculations)

[12] ftp://ftp.fao.org/agl/agll/docs/wsrr103e.pdf

[13] ACR Rate Reduction Methodology, Section 6: "Year t is the 12-month period following the first input of N fertilizer dedicated to the project crop(s)."

V. Soil Zone Classification Risk

RISK: The soil zone has been misclassified resulting in a qualitative misstatement.

VI. Land Location Risk

RISK: A farm or field outside of the project's geographic boundary has been included in the project.

VII. Incorrect Calculation of Emission Reductions

RISK: The emission calculations are materially incorrect due to one or multiple factors (e.g., using an incorrect formula, spring application for following crop year is included in calculation since it occurs within 12-month period for project crediting year)

VIII. Field Size Risks

RISK: Field size claimed may be incorrect and not reflect the cropped area of a field for any given year

IX. Cropping Risks

RISK: Crop used to calculate emission reduction wasn't grown (i.e. crop input error).

X. Applicability and Scope

RISK: Implementing the project activities somehow results in a violation of state or federal law.

RISK: The proper permit/regulatory requirements have not been met, nor enforced by the regulatory agency.

XI. Third Party Data Sources

RISK: Local weather recording station may have stopped operating for a period of time and the required local weather data is not available for one or more periods of time.

On-Farm Risk Parameters

I. Equipment Risks

RISK: If custom or variable rate technology (VRT) application is used, equipment should be confirmed as working properly (to guard against possible deviations between zone maps and actual applied to a specific field). There's also an equipment risk related to assuring adherence to other BMPs (e.g. ACR N rate methodology doesn't require specific data on source/placement).

RISK: Equipment taking measurements is not properly calibrated.

II. Irrigation Risks

RISK: If crop irrigation is utilized, amount of irrigation water applied is not included properly. (Per the Rate Reduction Methodology, "where crop irrigation is employed, irrigation water is considered equivalent to rainfall, and as such, project proponents will add irrigation water input to precipitation data to calculate total precipitation during the growing season.")

III. Record Collection & Storage

RISK: Project proponents have not sufficiently developed and/or applied quality assurance and/or quality control measures to collect, store, and manage data and information.

RISK: Relevant data is not clearly discernible to verifier based on documentation provided.

Verification Risk Parameters

While these risks are harder for a project developer to mitigate, a project developer does have the authority to choose a verifier who has previous expertise to mitigate these risks.

I. Limited knowledge of system

RISK: The audit team conducting the verification of these projects may lack knowledge and experience with agricultural projects and therefore, may:

- Need additional time or guidance to conduct verification;
- Require education on agricultural basics;
- Request irrelevant or inappropriate details to complete the verification; and/or
- Be unable to accurately explain the failure or success of the project

RISK: Verifiers may not have sufficient knowledge of all federal, state, and local laws to assess compliance.

II. Field Visits

RISK: The audit team does not understand what a site visit should entail for a crop-based GHG project.

RISK: The audit team's sample size is insufficient to ensure a reasonable level of assurance, as required by the ACR standard.

RISK: The site visit is scheduled at an inappropriate and/or inconvenient time including during the growers' busy season (e.g. harvest, planting, etc.) or when the ground is frozen or muddy.

Conclusion and Next Steps

The risk parameters outlined in this document represent the multitude of potential sources of error that could lead to a negative verification statement. By identifying and exposing the inherent and specific risks associated with ACR's N_2O Rate Reduction Methodology, C-AGG hopes this will increase project developer's comfort level with this methodology leading to an increase in project development activities and subsequent generation of carbon credits from N_2O emission reduction practices.

As a main stakeholder in the development of projects from these N_2O methodologies, project developers should take from this exercise the importance of controlling for project implementation risks and the level of responsibility placed upon them throughout the development of a project. Verifiers should now have a better understanding of the risk parameters that project developers are managing and a new framework to use when assessing the project documentation and management systems put in place by project developers. Using this new framework should result in a more accurate assessment of whether the controls that project developers have put in place do effectively mitigate the above risk parameters.

While most of the identified risks need to be addressed by project developers through the implementation of risk controls, C-AGG's WG identified two risks that could be mitigated through C-AGG's forum: project developers and/or verifiers gaps in knowledge of agricultural systems and gaps in knowledge of agriculture methodology requirements. As a next step, C-AGG's WG will outline the best strategy for addressing these specific opportunities through the C-AGG forum, which could include the development of training materials for projects developers and verifiers, facilitation of targeted workshops, or inclusion of topics on future C-AGG meeting agendas.