



# The American Carbon Registry® Validation and Verification Guideline

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# Introduction

The American Carbon Registry® (ACR) is a carbon market standard with an online greenhouse gas (GHG) registration and emissions tracking system used by members to transparently register verified, project-based emissions reductions and removals as serialized offsets, and record the purchase, sale, and retirement of tradable offsets, branded as Emission Reduction Tons (“ERTs”). ACR was founded in 1996 by the Environmental Resources Trust, and joined the non-profit Winrock International in 2007. Winrock International works with people in the U.S. and around the world to empower the disadvantaged, increase economic opportunity, and sustain natural resources. Key to this mission is building capacity for climate change mitigation and adaptation and leveraging the power of environmental markets.

## **Purpose**

This document details the required validation and verification that every GHG project must undergo in order for ACR to register the project’s GHG emission reductions/removal enhancements as serialized ERTs. ACR requires both validation and verification, by a competent independent third party approved by ACR, at intervals as specified in the *ACR Standard*. Validation and the first verification may be conducted simultaneously, and may be conducted by the same approved validation and verification body (VVB). This document is intended to guide VVBs and may also be used by Project Proponents to inform their understanding of what validation and verification will entail.

This document addresses only the validation and verification of project-based GHG emission reductions and removals, not verification of GHG inventories. The guidance is meant to be generalizable across a range of different eligible project types, thus may not provide comprehensive guidance for every project type for which ACR has an approved methodology. Additional validation and verification guidance for specific project types is given in the relevant sector standards and methodologies.

Finally, please note that this document does not address requirements for verification of projects developed using California Air Resources Board (ARB) compliance offset protocols and submitted for Offset Project Registry listing on ACR. Requirements for verification of compliance offset projects are given in the *Final Regulation Order: California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms* (Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations) and in the relevant ARB

Compliance Offset Protocols.<sup>1</sup> Verifiers of California compliance offset projects must be accredited by ARB.

**Citation**

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<sup>1</sup> See <http://www.arb.ca.gov/regact/2010/capandtrade10>.

## Acronym List

ACR	American Carbon Registry®
AFOLU	Agriculture, Forestry and Other Land Use
C	Carbon
CDM	Clean Development Mechanism
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
ERT	Emission Reduction Ton
GHGs	Greenhouse gases
GWP	Global warming potential
HFC	Hydrofluorocarbon
ISO	International Standardization Organization
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
N <sub>2</sub> O	Nitrous oxide
PFC	Perfluorocarbon
QA	Quality assurance
QC	Quality control
SF <sub>6</sub>	Sulfur hexafluoride
SSR	GHG sources, sinks and reservoirs
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified emission reduction

# Definitions

## **Accreditation**

Third-party attestation related to a conformity assessment body (a body that performs conformity assessment services, e.g. a verification/validation body) conveying formal demonstration of its competence to carry out specific certification tasks.<sup>2</sup>

## **Activity Data**

A proxy measure of the magnitude of an activity that causes greenhouse gas (GHG) emissions.

## **Additionality**

Additionality is a test intended to ensure that project offsets are in addition to reductions and/or removals that would have occurred in the absence of the project activity and without carbon market incentives. Project Proponents must demonstrate that the GHG emission reductions and removals associated with an offset project are above and beyond the “business as usual” scenario. ACR requires that every project *either* pass an approved performance standard and a regulatory additionality test, *or* pass a three-pronged test to demonstrate that the project activity is beyond regulatory requirements, beyond common practice, and overcomes at least one of three implementation barriers.

## **Agriculture, Forestry and Other Land Use (AFOLU)**

A broad category of ACR-eligible project activities that reduce GHG emissions and/or enhance GHG removals through changes in agriculture, forestry and land-use practices.

## **American Carbon Registry (ACR)**

The American Carbon Registry® (ACR) is a voluntary, online greenhouse gas registration and emissions trading system used by ACR members to transparently register verified emissions reductions and removals as serialized offsets; record the purchase, sale, and retirement of tradable offsets, branded as Emission Reduction Tons (“ERTs”); and optionally report, in a separate account, verified GHG inventories. ACR is an enterprise of Winrock International, a U.S. non-profit organization.

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<sup>2</sup> American National Standards Institute (ANSI) Accreditation Services Management System Policy Manual. ANSI-PL-100. See <https://www.ansica.org/wwwversion2/outside/ALLviewDoc.asp?dorID=69&menuID=1#doc9113>.

### **Annual Attestation Statement**

The statement that a Project Proponent provides annually to ACR relating to the continuance, ownership, and community and environmental impacts of a project. The Attestation is required in order to continue crediting.

### **Assurance**

Assurance refers to the degree of confidence a VVB can provide that the emission reductions and/or removal enhancements claimed in a GHG assertion are materially correct. ACR requires the VVB to provide a reasonable (as opposed to absolute or limited) level of assurance that the GHG assertion is free of material misstatement and provides a true and fair representation of the project's net GHG emission reductions/removal enhancements.

### **Audit Trail**

Historic data and supporting information made available for examination in order to evaluate the quality of a GHG project, and which allow material misstatements to be detected.

### **Baseline Scenario**

The project baseline is a counterfactual scenario that forecasts the likely stream of emissions or removals to occur if the Project Proponent does not implement the project, i.e., the "business as usual" case.

### **Buffer Pool**

ACR risk mitigation mechanism whereby the Project Proponent contributes an adequate number of eligible ACR offsets to a buffer pool held by ACR to replace unforeseen losses in carbon stocks. The buffer contribution is a percentage of the project's reported offsets, determined through a project-specific assessment of the risk of reversal.

### **Carbon Dioxide**

Carbon dioxide (CO<sub>2</sub>) is a chemical compound comprising two oxygen atoms bonded to a single carbon atom, and is the primary greenhouse gas implicated in global warming.

### **Carbon Dioxide-equivalent (CO<sub>2</sub>e)**

Carbon dioxide equivalence (CO<sub>2</sub>e) is a metric to compare GHGs based on their global warming potential (GWP) relative to one metric ton of CO<sub>2</sub> over the same timeframe. The Intergovernmental Panel on Climate Change publishes GWP values for converting all GHGs to a CO<sub>2</sub>e basis.

**Carbon Offset**

In a voluntary market context, a carbon offset is a reduction, removal, or avoidance of GHG emissions that is used to compensate for GHG emissions that occur elsewhere. In a cap-and-trade context, offsets are “GHG reductions from projects undertaken outside the coverage of a mandatory emissions reduction system for which the ownership of verifiable GHG emission reductions can be transferred and used by a regulated source to meet its emission reduction obligations.”<sup>3</sup> The ACR registers both voluntary market and compliance offsets.

**Certification**

Certification is the result of a successful eligibility screening of a GHG Project Plan. Certification confirms that the GHG Project Plan complies with ACR standards and, if the Project Proponent follows faithfully the GHG Project Plan during project implementation and monitoring, and secures a positive independent verification, the Proponent will ultimately be able to register the project’s GHG reductions/removals on ACR. Certification does not reflect any ACR opinion on the number of ERTs that will ultimately be verified and issued.

**Clean Development Mechanism (CDM)**

The CDM allows GHG emission reduction and removal projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one metric ton of CO<sub>2</sub>, which can be sold and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol. The CDM is intended to stimulate sustainable development and emission reductions, while giving industrialized countries flexibility in how they meet their emission reduction targets. ACR accepts certain methodologies and tools from the CDM.

**Climate, Community & Biodiversity Alliance (CCBA)**

The CCB Standards are published by the Climate, Community & Biodiversity Alliance (CCBA), a partnership of international NGOs seeking to foster the development of forest protection and restoration activities around the world that deliver significant climate, community and biodiversity benefits. The CCB Standards include requirements to ensure that local stakeholders are engaged in the design and implementation of emissions reductions activities and that they and their natural environment benefit from these activities.<sup>4</sup> The CCB Standards address only the community and biodiversity impacts of a project, not its GHG reductions or removals; validation and verification against the CCB Standards therefore does not satisfy ACR requirements for

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<sup>3</sup> Adapted from Pew Center on Global Climate Change. *Climate Change 101: Cap and Trade*. <http://www.pewclimate.org/docUploads/Cap&Trade.pdf>.

<sup>4</sup> <http://www.climate-standards.org/index.html> and personal communication, Climate, Community & Biodiversity Alliance.

registering GHG emission reductions/removals. Project Proponents may choose to pursue approval against the CCB Standards to complement project registration on ACR.

### **Commercially Sensitive Information**

Trade secrets, financial, commercial, scientific, technical or other information whose disclosure could result in a material financial loss or gain, prejudice the outcome of contractual or other negotiations, or otherwise damage or enrich the person or entity to which the information relates.

### **Community**

A community includes all groups of people including indigenous peoples, mobile peoples and other local communities, who live within or adjacent to the project area as well as any groups that regularly visit the area and derive income, livelihood or cultural values from the area. This may include one or more groups that possess characteristics of a community, such as shared history, shared culture, shared livelihood systems, shared relationships with one or more natural resources (forests, water, rangeland, wildlife, etc.), and shared customary institutions and rules governing the use of resources.<sup>5</sup>

### **Community and Environmental Impacts**

Community and environmental impacts are the effects, both positive and negative, that project activities may have on the socioeconomic well-being of affected communities or environmental quality in the project area. ACR requires that project activities provide net benefits to affected communities and the environment, and do not provide perverse incentives for the clearing of land to generate carbon offsets.

### **Confidence**

Emissions estimates are often expressed as a confidence interval, or the probability that the true value will fall within a certain range of values about the mean value. Unless superseded by an ACR sector standard, verification analyses of quantification methodologies and measurement results shall be based on the *ACR Standard* requirement of a 90% confidence interval with a relative error of  $\pm 10\%$  of the mean. If the 90% confidence interval's relative error is greater than  $\pm 10\%$  of the mean, then the lower confidence limit value shall be used for carbon offset baseline emissions estimates and the upper confidence limit value shall be used for carbon offset project activity emissions estimates, in the case of projects reducing emissions. The upper bound of the 90% confidence interval shall be used for baseline sequestration

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<sup>5</sup> CCB Standards - Project Design Standards. Second Edition (2008). Climate, Community & Biodiversity Alliance.

estimates, and the lower bound of the 90% confidence interval shall be used for project activity sequestration estimates, in the case of projects enhancing removals.

### **Crediting Period**

Crediting period is the finite length of time during which the project's GHG Project Plan is valid, and during which a project can generate offsets for registration on ACR against its baseline. The baseline must be re-evaluated in order to renew the crediting period. ACR sector standards specify crediting periods for particular project types.

### **Data Quality Indicators**

Data quality indicators can include both quantitative measures, e.g. statistical measures of bias and precision, confidence intervals, numerical rankings/ranges, etc., and qualitative indicators, e.g. qualitative summaries of GHG emissions inventory or reductions relative strengths and limitations.

### **Data Quality Objectives**

Statements of acceptable uncertainty in reported data, to ensure that it is of sufficient quality to support its end use. They are based on the specified data collection and quantification methodologies and the quality of available data. Data quality objectives identify the end use of the data and the level of uncertainty anticipated for GHG estimates.

### ***De Minimis***

The ACR sets a *de minimis* threshold of 3% of the final calculation of emission reductions or removals. For the purpose of completeness, any decreases in carbon pools and/or increases in GHG emission sources that exceed the *de minimis* threshold must be included. Any exclusion using the *de minimis* principle shall be justified using fully documented *ex ante* calculations. ACR sector-specific standards in some cases provide additional guidance on application of the *de minimis* threshold, conservativeness principle, and sources and sinks that may be considered insignificant *a priori*.

### **Direct Emissions**

Emissions from sources or sinks owned or controlled by the Project Proponent. These sources typically include any equipment consuming fossil fuels, processes which may emit GHGs, and/or terrestrial GHG sinks.

### **Eligibility Screening**

ACR screens a GHG Project Plan against the *ACR Standard* and any relevant ACR sector standard to determine whether the project meets all ACR requirements. The result of a successful eligibility screening is Certification of the GHG Project Plan.

### **Emissions Data**

Data derived from the direct measurement of emissions from an emissions source, or an estimation thereof based on a calculated result of an algorithm using activity data, emission factors, or a predictive model.

### **Emission Factor**

A coefficient which relates an activity datum to the quantity of GHG emissions released to the atmosphere. Emission factors are often based on a sample of measured emissions data which are then averaged to develop a representative rate of GHG emissions for a given activity level under a given set of operating conditions.

### **Emission Reduction Ton (ERT)**

The “ERT” is the ACR unit of exchange for tradable, project-based carbon offsets. ACR issues one ERT for each metric ton of verified CO<sub>2</sub>e emission reductions or removals. ERTs issued to a project equal the project’s Net Emission Reductions minus the offsets set aside in the ACR buffer pool (if applicable).

### **Facility**

A physical location at which GHG emissions are generated, and/or GHG emissions reductions are achieved.

### **Field Verification**

The act of visiting project facilities or lands to conduct facility- or project-specific verification activities.

### **Global Warming Potential (GWP)**

Global warming potential is a relative scale translating the global warming impact of any GHG into its CO<sub>2</sub> equivalent over the same timeframe. The Intergovernmental Panel on Climate Change periodically updates the list of GHGs and their GWP factors based on the most recent science. ACR requires Project Proponents to calculate GHG reductions and removals based on

the SAR 100-year GWPs in the IPCC *Fourth Assessment Report* (AR4), Working Group 1, Chapter 2, Table 2.14.<sup>6</sup>

### **Greenhouse Gas (GHG)**

A greenhouse gas is any gaseous compound that absorbs infrared radiation in the atmosphere and contributes to the warming of the atmosphere. The primary GHGs regulated under the Kyoto Protocol are carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). The Intergovernmental Panel on Climate Change lists, and periodically updates, GHGs in its assessment reports. ACR's scope includes all GHGs (including Ozone-Depleting Substances) listed in the IPCC *Fourth Assessment Report* (AR4), Working Group 1, Chapter 2, Table 2.14.

### **GHG Assertion**

A statement made by the Project Proponent regarding the GHG emission reductions and/or removal enhancements achieved by a project over a specified reporting period. A GHG assertion must be clearly defined and amenable to consistent evaluation or measurement against the criteria and requirements specified by the *ACR Standard*, relevant ACR sector standard, and this *Validation and Verification Guideline*.

### **GHG Emissions Reductions and Removals**

A GHG emission reduction is the measured decrease of GHG emissions over a specified period of time relative to an approved baseline. A GHG removal is the total mass of GHG removed from the atmosphere over a specified period of time relative to an approved baseline.

### **GHG Emissions System/Trading Program**

A voluntary or regulated program that allows for trading in project-based GHG emissions reductions or removals, government-issued credits, and/or allowances.

### **GHG Project Plan**

A GHG Project Plan is a document that describes the project activity, satisfies eligibility requirements, identifies sources and sinks of GHG emissions, establishes project boundaries, describes the baseline scenario, defines how GHG quantification will be done and what methodologies, assumptions and data will be used, and provides details on the project's

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<sup>6</sup> See page 212. The SAR 100-year values are in the fourth column from the right. Although the IPCC provides a new set of 100-year values in the second column from the right, and may again update GWP values in forthcoming assessment reports, for reasons of fungibility ACR currently requires Project Proponents to use the SAR values. This requirement may change in the future.

monitoring, reporting and verification procedures. ACR requires every project to submit a GHG Project Plan using an ACR-approved methodology. A template for GHG Project Plans is available at [www.americancarbonregistry.org](http://www.americancarbonregistry.org).

### **Impermanence**

GHG reductions/removals from terrestrial activities are impermanent in the sense that they are subject to some risk of future reversal, including unintentional reversals (e.g., fire, flood, insect infestation etc. for terrestrial projects) and intentional reversals (e.g., landowners choosing to discontinue project activities).

### **Impermanence Risk Analysis**

To account for and mitigate against the risk of reversal in some projects, ACR requires Project Proponents to conduct a risk analysis to determine the number of offsets that must be set aside in the ACR buffer pool (unless the Proponent elects a different ACR-approved risk mitigation mechanism). The risk analysis evaluates several types of risk – project, economic, regulatory, and social and environmental/natural disturbance – and must be conducted using an ACR-approved risk analysis/buffer determination tool.

### **Indirect GHG Emissions**

GHG emissions which occur due to activities of the Project Proponent but are not directly released into the atmosphere from sources owned or controlled by the Project Proponent. Indirect emissions can occur upstream or downstream from activities directly controlled by the Project Proponent.

### **Intergovernmental Panel on Climate Change (IPCC)**

The IPCC is “the leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.”<sup>7</sup>

### **Leakage**

Leakage is a decrease in sequestration or increase in emissions outside project boundaries as a result of project implementation. Leakage may be caused by shifting of the activities of people present in the project area, or by market effects whereby emission reductions are countered by emissions created by shifts in supply of and demand for the products and services affected by the project.

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<sup>7</sup> <http://www.ipcc.ch/organization/organization.htm>.

**Material Misstatement**

An inaccurate assertion of an offset project's GHG emission reductions/removals, which may reasonably be expected to influence decisions or actions taken by the users of the GHG project information. Errors, omissions, and misstatements are considered material if they exceed a defined threshold. Materiality is also used as part of the verification plan design, to determine the type of verification processes to be used by the VVB to minimize the risk of not detecting a material misstatement. ACR's materiality threshold is  $\pm 5\%$  of the GHG project's emission reductions or removal enhancements. To accept a verification statement, ACR requires that discrepancies between the emission reductions/removal enhancements claimed by the Project Proponent and estimated by the VVB be below this threshold. Individual or aggregation of errors or omissions greater than the ACR materiality threshold of  $\pm 5\%$  require re-stating before verification statements will be accepted. Individual and aggregation of errors or omissions greater than  $\pm 1\%$ , but less than  $\pm 5\%$ , must be qualified in the verification statement.

**Methodology**

A systematic explanation of how a Project Proponent established the project baseline scenario(s), and estimates and monitors emissions reductions or removals by following scientific good practice. Good practice entails that a methodology be conservative, transparent, and thorough.

**Methodology Deviations and Revisions**

A methodology deviation is a project-specific change to an existing methodology due to a change in the conditions, circumstances or nature of a project. A methodology revision is a fundamental change in an existing methodology due to a change in conditions, circumstances or general developments in knowledge. ACR approval of methodology deviations is determined by ACR staff, if necessary in consultation with the relevant ACR technical committee. Approval of methodology revisions will require review by the relevant ACR technical committee and/or external scientific peer review.

**Methodological Tools**

An approved component of a methodology (i.e., a stand-alone methodological module to perform a specific task) or a calculation tool (i.e., spreadsheets or software that perform calculation tasks) that a Project Proponent uses to quantify net GHG reductions/removals or meet other ACR requirements.

**Monitoring**

Continuous or periodic direct measurements and/or indirect assessment of GHG emissions, reductions, or other GHG data.

**Net Emissions Reductions**

Net emissions reductions are GHG emissions reductions or removals created by a project activity, which are equal to the GHG emissions associated with the baseline scenario, minus GHG emissions associated with the project activity, minus any required deductions for uncertainty and leakage.

**Ozone-Depleting Substances**

Ozone-depleting substances (ODS) include controlled substances under Annexes A, B, C and E of the Montreal Protocol.<sup>8</sup> Many ODS are also potent GHGs. The Montreal Protocol controls the consumption, production and international trade of ODS, but not emissions, and thus destruction of ODS in already existing facilities and equipment worldwide has the potential to prevent significant GHG emissions.

**Project Boundaries**

Project assessment boundaries include a project's geographical implementation area, the types of GHG sources and sinks considered, the carbon pools considered, and the project duration.

**Project Proponent**

An individual or entity that undertakes, develops, and/or owns a project. This may include the project investor, designer, and/or owner of the lands/facilities on which project activities are conducted. The Project Proponent and landowner/facility owner may be different entities.

**Quality Assurance (QA)**

A planned system of internal review procedures conducted by personnel not directly involved in GHG project data collection and management. This review is designed to determine the quality of the GHG project data, reduce or eliminate any inherent error or bias in the emissions reduction data management processes, and assess the effectiveness of the internal QC program.

**Quality Control (QC)**

A system of routine technical activities to determine and control the quality of the data/information collection and management systems associated with a GHG emissions

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<sup>8</sup> See [http://ozone.unep.org/Publications/MP\\_Handbook](http://ozone.unep.org/Publications/MP_Handbook).

reduction project. The QC system is designed to identify and reduce errors and omissions, provide routine checks to maximize consistency in the emissions reduction development processes, and facilitate internal and external review and verification.

### **Standard**

A standard is an established norm or requirement in a formal document that establishes uniform engineering or technical criteria, methods, processes and practices. Standards may provide general guidance across all project types or be sector-specific. While ACR may accept methodologies and tools from other GHG programs, ACR only registers projects meeting applicable ACR standards.

### **Start Date**

ACR defines the start date for all projects other than AFOLU as the date on which the project began to reduce GHG emissions against its baseline. ACR defines the start date for AFOLU projects as the date on which the Project Proponent began the activity on project lands. More specific guidance on Start Date is provided in the relevant ACR sector standards and methodologies.

### **Uncertainty**

A statistical parameter associated with the result of a direct measurement or indirect quantitative estimate that characterizes the dispersion of values that could be reasonably attributed to the measured/estimated quantity, e.g. the sample variance or coefficient of variation. For GHG emission reductions and removal estimates, uncertainty may result from factors such as the application of non-representative quantification methodologies or emission factors, incomplete data, lack of transparency, measurement error, etc. Reported uncertainty information typically specifies a quantitative estimate of the likely or perceived difference between or dispersion among reported values, and a qualitative description of the likely causes of said differences.

### **Validation**

Validation is the systematic, independent and documented process for the evaluation of a GHG Project Plan against applicable requirements of the *ACR Standard*, any relevant sector standard, and the applicable ACR-approved methodology.

### **Validation Report**

A formal written report from an approved VVB, providing assurance that a GHG Project Plan is in conformity with all applicable requirements of the *ACR Standard*, any relevant sector standard, and the applicable ACR-approved methodology.

### **Validation/Verification Body (VVB)**

A competent and independent person, persons or firm responsible for performing the validation and/or verification process. To conduct validation and verification the VVB must be ACR-approved, and accredited by the American National Standards Institute (ANSI) or be a Designated Operational Entity approved under Clean Development Mechanism or Accredited Independent Entity approved under Joint Implementation.

### **Verification**

Verification is the systematic, independent, and documented process for the evaluation of a GHG assertion against specific criteria. The verification process is intended to assess the degree to which a project has correctly quantified net GHG reductions or removals per the validated GHG Project Plan, correctly utilizes ACR methodologies and tools, and continues to meet applicable ongoing requirements of the *ACR Standard* and sector-specific standard. A successful verification provides reasonable assurance that the GHG assertion is without material misstatement.

### **Verification Statement**

A formal written declaration from an approved VVB providing assurance that a GHG assertion is in conformity with the validated GHG Project Plan, applicable requirements of the *ACR Standard*, any applicable sector standard and the chosen methodology. The verification statement includes the number of ERTs verified for the reporting period and the VVB's opinion whether the GHG assertion is materially correct.

# Chapter 1: Validation Overview

This chapter summarizes the objectives and scoping elements of validation necessary to register project-based GHG reductions or removals. ACR's validation requirements are built on the foundation of the International Organization for Standardization (ISO) 14064 Part 3: *Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions*.

## **A. Definition**

Validation is the systematic, independent and documented process for the evaluation of a GHG Project Plan against applicable requirements of the *ACR Standard*, any relevant sector standard, and the applicable ACR-approved methodology.

## **B. Objectives of Validation**

The overall goal of third-party validation is to review impartially and objectively a GHG Project Plan against the requirements laid out in the relevant ACR standard(s) and methodology. The VVB must independently evaluate the project design and planning information, based on supporting documentation and GHG validation best practice.

The objectives of validation are to evaluate:

- Conformance to the *ACR Standard* and any applicable sector standard;
- GHG emissions reduction project planning information and documentation in accordance with the applicable ACR-approved methodology, including the project description, baseline, monitoring and reporting procedures, and quality assurance/quality control (QA/QC) procedures;
- Reported GHG baseline, *ex ante* estimated project emissions and emission reductions/removal enhancements, leakage assessment, and impermanence risk assessment and mitigation (if applicable).

The VVB shall review any relevant additional documentation provided by the Project Proponent to confirm the project's eligibility for registration on ACR.

## **C. Scope of Validation**

Validation shall include examination of all of the following elements of a GHG Project Plan.

- Project boundary and procedures for establishing the project boundary;

- Physical infrastructure, activities, technologies, and processes of the GHG project;
- GHGs, sources and sinks within the project boundary;
- Temporal boundary;
- Description of and justification for the baseline scenario;
- Methodologies, algorithms, and calculations that will be used to generate estimates of emissions and emission reductions/removal enhancements;
- Process information, source identification/counts, and operational details;
- Data management systems;
- Quality Assurance/Quality Control (QA/QC) procedures;
- Processes for uncertainty assessments;
- Project-specific conformance to ACR eligibility criteria, including additionality.

#### ***D. Interval of Validation***

The *ACR Standard* requires validation of the GHG Project Plan only once per Crediting Period, since the Project Plan remains valid for the duration of the Crediting Period. The length of the Crediting Period for different eligible project types is given in the applicable ACR standard or methodology.

Renewal for another Crediting Period requires re-validation.

## Chapter 2: Validating Project Boundaries

The assessment of GHG project boundaries is a critical component of validation. Project boundaries must be clearly defined and transparently delineated in the GHG Project Plan. ACR defines GHG project boundaries to include the project's geographical implementation area, the types of GHG sources and sinks considered, the carbon pools considered (if applicable), and the project duration.

The *ACR Standard* states:

*The Project Proponent shall select or establish criteria and procedures for the selection of relevant GHG sources, sinks and reservoirs for regular monitoring or estimation. The Project Proponent shall justify in the GHG Project Plan the exclusion from regular monitoring of any relevant GHG source, sink or reservoir. In accordance with ISO 14064-2:2006, the Project Proponent shall select or establish criteria, procedures and/or methodologies for quantifying GHG emissions and/or removals for selected GHG sources, sinks and/or reservoirs. The Project Proponent shall quantify GHG emissions and/or removals separately for each relevant GHG for each GHG source, sink and/or reservoir relevant for the project and for the baseline scenario.*

*The Project Proponent shall provide a detailed description of the geographic boundary of project activities. The project activity may contain more than one facility or discrete area of land, but each facility or land area must have a unique geographical identification, and each land area must meet the land eligibility requirements of the relevant ACR sector standard, if applicable. For Agriculture, Forestry and Other Land Use (AFOLU) projects, the Project Proponent shall provide maps, Geographic Information System (GIS) shapefiles, or other relevant information to delineate the project boundary.*

### **A. Physical or Geographic Boundary**

To validate project boundaries, the VVB shall confirm through visual and/or photographic evidence, maps, GIS files, operating logs, and/or interviews with site operations personnel the accuracy of the project boundaries as defined in the GHG Project Plan.

### **B. GHG Assessment Boundary**

Because the project boundary includes the types of GHG sources and sinks considered and the carbon pools considered (if applicable), the VVB must evaluate the rationale presented in the GHG Project Plan for inclusion/exclusion of SSRs, including the justification given for excluding particular SSRs as *de minimis* or conservative, and confirm that this is consistent with the GHG assessment boundary section of the chosen methodology. The VVB shall confirm that the guidance in the *ACR Standard*, any applicable sector standard, and the chosen methodology

has been applied regarding significance testing, *de minimis* exclusions, and *a priori* exclusions of particular SSRs.

**C. Temporal Boundary**

Because the project boundary includes the project duration, the VVB must evaluate whether the Start Date, Crediting Period, and Project Term proposed in the GHG Project Plan are consistent with the ACR Standard, ACR sector standard if applicable, and chosen methodology.

## Chapter 3: Validating Project Baselines

The project baseline scenario is a counterfactual scenario<sup>9</sup> which forecasts the likely stream of emissions expected to occur if the Project Proponent does not implement the project, i.e., the "business as usual" case.

### A. Types of Baselines

Conventionally three distinct approaches have been taken for establishing GHG project baselines.<sup>10</sup> First, existing actual or historical emissions may be assumed to continue over the project lifetime or Crediting Period. This is termed the "retrofit" baseline in which pre-retrofit measurements of actual emissions determine the project baseline. A retrofit project may involve the replacement of GHG emissions equipment/fuels with lower emitting equipment/fuels, or the installation of GHG emissions reduction equipment. Baseline emissions are equal to historical actual GHG emissions prior to the installation of the GHG-reducing technology or change in practice.

Second, the baseline may reflect emissions and removals from a technology or practice that represents an economically attractive course of action, taking into account barriers to investment. This is termed a "project-specific" baseline approach. To determine a project-specific baseline, the Project Proponent evaluates barriers and net benefits associated with feasible alternative baseline scenarios, including the continuation of current activities, and identifies the baseline scenario with the lowest barriers and greatest benefits. The emissions/removals associated with this alternative become the baseline scenario against which emission reductions/removal enhancements in the project scenario are measured.

Third, baseline emissions may be assumed to be the average emissions of similar project activities undertaken in the recent past in similar social, economic, environmental and technological circumstances, and whose performance is among the top specified percentage in their category. This is termed the "performance standard" approach. Project actions that, with respect to emission reductions or removal enhancements, or technologies or practices, achieve significantly better performance (e.g. lower emissions or higher removals per unit output) than the pre-established performance standard benchmark, are considered additional or beyond that

<sup>9</sup> If applied to the project area; the option also exists of monitored baselines on proxy areas.

<sup>10</sup> See for example World Resources Institute/World Business Council for Sustainable Development (WRI/WBCSD) Greenhouse Gas Protocol Initiative: *The GHG Protocol for Project Accounting* (November 2005). [http://www.ghgprotocol.org/files/ghg\\_project\\_protocol.pdf](http://www.ghgprotocol.org/files/ghg_project_protocol.pdf).

which would be expected under a business-as-usual scenario.<sup>11</sup> Provided the project action is also surplus to regulations, all emission reductions/removal enhancements relative to the baseline are creditable under this approach.

The VVB will confirm that the type of baseline used in the GHG Project Plan correctly applies the guidance in the chosen methodology.

### ***B. Validating Project Baselines***

Project Proponents shall use appropriate methodologies and tools to estimate and update project baselines. The baseline scenario remains valid for the duration of the approved Crediting Period for that project type, and must be re-assessed in order to renew the Crediting Period.

The objective of baseline validation is to check that technically sound baseline emissions have been established and subsequently applied. To establish baseline emissions, data representative of the operations and activities must be used, either from a single year or a multi-year average.

The VVB must ensure that the baseline scenario chosen is one for which verifiable data are available. Documentation should include the baseline scenario selection rationale and justification, the guidance followed for baseline emissions estimation, and consistency across post-base year project emissions calculations (to provide accurate comparisons).

Validation of the project baseline should include:

- The explanation provided for how the baseline scenario was selected, including assessment of alternative baseline scenarios and their associated barriers and benefits;
- Data associated with the base year chosen, and consistency in implementation of emissions estimating guidance for the baseline and project emissions.

Baseline validation may include the following activities, data and evidence sources (as informed by the VVB's professional judgment; not all are required):

- Interviews with Project Proponent to determine how baseline emissions have been quantified;

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<sup>11</sup> Adapted from EPA Climate Leaders (2009): Using Offsets to Help Climate Leaders Achieve Their GHG Reduction Goals: Climate Leaders Offset Module Overview.  
See <http://www.epa.gov/stateply/documents/resources/OffsetProgramOverview.pdf>.

- Review of sufficient documentation for any baseline emissions sources which contribute to total emissions by more than 3%, to confirm that estimates have been addressed per stated measurement and monitoring plans, and that the estimations have been applied consistently and uniformly;
- Check consistency with the appropriate guidance as well as consistency in applying the guidance across baseline and project activity reporting periods.

## Chapter 4: Validating Additionality

Additionality is a test intended to ensure that project offsets are in addition to reductions and/or removals that would have occurred in the absence of the project activity and without carbon market incentives. Project Proponents must demonstrate that the GHG emission reductions and removals associated with an offset project are above and beyond the “business as usual” scenario. To qualify as additional, ACR requires every project to pass *either* an approved performance standard and a regulatory additionality test, *or* a three-pronged test of additionality in which projects demonstrate that the activity exceeds currently effective regulations, exceeds common practice in the relevant industry sector and geographic region, and overcomes at least one of three implementation barriers -- financial, technological, or institutional. See the *ACR Standard*, Chapter 4 and relevant sector-specific standards and methodologies. Some methodologies recommend, and some require, application of an additionality tool.

Each component of the additionality demonstration should be evaluated by the VVB

### **A. Regulatory Surplus Test**

The regulatory surplus test involves existing laws, regulations, statutes, legal rulings, or other regulatory frameworks that directly or indirectly affect GHG emissions associated with a project action or its baseline candidates, and which require technical, performance, or management actions. Project Proponents must provide clear evidence in the GHG Project Plan that the GHG reduction/removal activity is not required by any applicable and enforced federal, Tribal, state, or local laws, regulations, ordinances, consent decrees, or other legal arrangements. Only mandatory regulations, not voluntary guidelines, are considered in the regulatory surplus test.

To validate the results of the regulatory surplus test, the VVB shall review applicable regulations identified by the Project Proponent in the GHG Project Plan. If there are significant uncertainties associated with the regulatory requirements, the VVB shall conduct additional research and, if needed, contact the appropriate federal, state, Tribal or local environmental compliance officer to collect additional documentation (e.g., notices of violation, consent decrees, settlement agreements, etc.) and testimonial evidence.

### **B. Common Practice Test**

The common practice test requires Project Proponents to evaluate the predominant technologies implemented or industry practices undertaken in a particular industry sector and/or geographic region, as determined by the degree to which those technologies/practices have

penetrated the market, and demonstrate that the proposed project will reduce GHG emissions below levels produced by common technologies or practices within a comparable environment (e.g., geographic area, regulatory framework, investment climate, access to technology/financing, etc.).

To validate the results of the common practice test, the VVB shall review the documentation provided by the Project Proponent to demonstrate that the GHG project is not common practice. In addition to this documentation, the VVB should review all original reference sources cited in the Project Proponent's documentation, such as independent consultants' reports designed to describe common practice technologies/practices, to confirm the raw data and conclusions drawn thereupon.

### **C. Implementation Barriers Test**

An implementation barrier represents any factor or consideration that would prevent the adoption of the project activity. Under the implementation barriers test, Project Proponents choose at least one of three barrier assessments: financial, technological, or institutional. Project Proponents may demonstrate that their project overcomes more than one implementation barrier, but ACR does not require more than one barrier.

#### Financial barriers test

Financial barriers can include high costs, limited access to capital, or an internal rate of return in the absence of carbon revenues that is lower than the Project Proponent's established minimum acceptable rate. Financial barriers can also include high risks such as unproven technologies or business models, poor credit rating of project partners, and project failure risk. Carbon revenues can potentially address capital constraints, incentivize project implementation, or help to maintain the project's ongoing economic viability. If electing the financial implementation barrier test, Project Proponents shall provide solid quantitative evidence such as net present value (NPV) and internal rate of return (IRR) calculations. Use of an ACR-approved additionality tool is recommended.

The VVB shall review internal financial *pro formas* and historic/projected cash flow analyses prepared by the Project Proponent, and/or by an external party, to confirm the validity of the financial barrier claim. As needed the Project Proponent and VVB may execute a non-disclosure agreement. The VVB should assess to what extent the assumptions used in the financial barriers analysis are defensible, how a variation on those assumptions (sensitivity analysis) could affect the outcome of the financial barriers test, and how likely such variations are during the project life.

### Technological barriers test

Technological barriers can include R&D deployment risk, uncorrected market failures, lack of trained personnel and supporting infrastructure for technology implementation, and lack of knowledge on the practice/activity. Project Proponents electing the technological implementation barrier test should provide evidence that carbon market incentives are a key element in overcoming these barriers.

The VVB shall review documentation provided by the Project Proponent to demonstrate significant carbon credit creation activities occurring either before or no later than two years after the project start date. In addition, the VVB shall review all documentation provided by the Project Proponent regarding the development status of the technology being implemented by the project activity, supplementing those materials as needed with publicly available demographic and characteristic information on the industry sector and technology type.

### Institutional barriers test

Institutional barriers can include institutional opposition to technology implementation, limited capacity for technology implementation, lack of management consensus, aversion to upfront costs, and lack of awareness of benefits. If electing the institutional implementation barrier test, Project Proponents shall provide documentation of Project Proponent, landowner, or facility owner management policies or guidelines which corroborate the claim of an organizational or institutional barrier, and should provide evidence that carbon market incentives are a key element in overcoming these barriers.

To validate these claims, the VVB shall collect testimonial evidence from the appropriate management personnel with purview over the GHG project's approval and implementation.

### ***D. Performance Standard Test***

In lieu of the three-prong test to demonstrate project-level additionality, ACR also recognizes the "performance standard" approach in which additionality is demonstrated by showing that a proposed project activity is surplus to all applicable regulations, and either is characterized by very low adoption rates in the relevant industry and geographic region, or results in lower emissions (or higher sequestration) than a benchmark established for the relevant region, industry/sector, and practice.

Performance standards vary by project type but generally include the above two components. The Project Proponent must first demonstrate in the GHG Project Plan that the project activity is

not required by any applicable federal, Tribal, state, or local laws, regulations, ordinances, consent decrees, or other legal arrangements. Only mandatory regulations, not voluntary guidelines, are considered in the regulatory surplus test. The VVB shall review applicable regulations identified by the Project Proponent in the GHG Project Plan. If there are significant uncertainties associated with the regulatory requirements, the VVB shall conduct additional research and, if needed, contact the appropriate federal, state, Tribal or local environmental compliance officer to collect additional documentation (e.g., notices of violation, consent decrees, settlement agreements, etc.) and testimonial evidence.

Second, the Project Proponent must demonstrate in the GHG Project Plan that the project activity achieves a level of performance with respect to emission reductions and/or removals that is significantly better than business as usual. This is done by comparing the project activity to a performance threshold, specific to each project type and established by examining data from similar recently undertaken practices in the same geographic region and industry/sector. In some cases the performance standard will establish that common practice adoption rates of a particular GHG-reducing practice or technology are very low and therefore the practice or technology is deemed additional. In other cases the performance standard benchmark represents a level of emissions or sequestration per unit output to which Project Proponents compare the measured performance of their project, demonstrating that the project activity achieves lower emissions or higher sequestration per unit output than the benchmark.

Validation of the performance standard will vary somewhat depending on the project type. For performance standards in which additionality is demonstrated by comparison to common practice adoption rates of a particular GHG-reducing practice or technology, the VVB need only check that an approved methodology was applied. For performance standards in which actual project performance (e.g. emissions or sequestration per unit output) is monitored and compared to a benchmark, the VVB will review measurement and monitoring methods as described elsewhere in this *Guideline*, but the performance benchmark itself will be as established in the ACR-approved methodology and need not be validated.

## Chapter 5: Validating Quantification Methodologies

ACR requires every project submitted for registration to use an ACR-approved methodology or secure ACR approval of a new methodology or methodology modification. ACR-approved methodologies include those published by ACR after public consultation and scientific peer review; methodologies in the approved list at [www.americancarbonregistry.org](http://www.americancarbonregistry.org); approved CDM methodologies; methodologies approved under other GHG programs, provided they have been reviewed and approved by ACR; and modifications of existing methodologies, provided they have been reviewed and approved by ACR.

The *ACR Standard* states:

*Project Proponent shall use ACR-approved tools, procedures and methodologies to quantify GHG emission reductions and removals. The Project Proponent shall apply these tools and methodologies to quantify the difference between the GHG emissions and/or removals from sources, sinks and reservoirs relevant for the project and those relevant for the baseline scenario.*

This chapter addresses validation of GHG quantification methods for estimating emission reductions and removal enhancements. Included are brief summary descriptions of commonly used quantification methods, along with specific examples of their applicability and validation issues.

When validating quantification methods, the objective is to collect sufficient evidence to ensure that quantification methods are appropriately selected and applied to develop accurate and conservative estimates of emission reductions and removals.

The process of validating quantification methods requires review of four elements:

- Quantification method for each data type is clearly defined, and the degree of supporting documentation provided is adequate to support the level of assurance required;
- Methods are appropriate for accurately quantifying each data type based on the required level of assurance;
- Methods are applied consistently to develop estimates of emission reductions and removal enhancements;
- The ISO principle of conservativeness is applied; i.e., the choice of assumptions, calculation methods, parameters, data sources, and emission factors is more likely to

lead to an underestimation than overestimation of net GHG emission reductions and removal enhancements.

### **A. Emissions Data**

Emissions data can be directly measured, for example with continuous emissions monitoring equipment, or indirectly estimated, for example by monitoring a surrogate parameter or using a predictive model. Emissions data may also be derived from activity data and emission factors, as described in later sections.

For direct emissions monitoring or process monitoring methodologies for quantifying GHG emissions, validation activities should consider the following:

- Operation and calibration of equipment;
- Existence and appropriateness of operation and maintenance standard operating procedures;
- Consistent and accurate data management;
- Representativeness of sampling for operating parameters;
- Robustness of test data to substantiate use of process parameters as “surrogates” or to substantiate use of predictive algorithms;
- Accuracy of material and energy input and output estimates;
- Appropriate operation and maintenance of instrumentation;
- Review of calibration records, equipment manufacturer documentation, and service records.

### **B. Activity Data**

The accurate and conservative estimation of GHG emission reductions/removal enhancements is the key goal of quantification methodologies. Project Proponents will often estimate emissions based on activity data, information that provides the magnitude of the activities that cause the emissions during a GHG accounting and reporting period.

The objective of validation is to confirm that the activity data used in the emission calculations: (1) meet the requirements of the approved methodology and are appropriate for the emission sources; (2) have been correctly applied from the original documentation; and (3) that the most accurate activity data readily available have been used. The VVB should confirm that the methodology accounts for all variations in activity data over the relevant Crediting Period.

### **C. Emission Factors**

Estimating GHG emissions using activity data, such as fuel combusted or inputs consumed, requires the application of an emission factor. Emission factors are usually expressed as the ratio of the mass of GHG emitted to the unit weight, volume, distance, or duration of the activity emitting the GHG. In general, emission factors are either:

- **Default** emission factors taken from an external source such as the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, U.S. Energy Information Administration or USEPA publications, etc. They are specific to a given parameter, such as fuel type, electricity prime mover, production method, and geographic area. Default emission factors are readily available for many sources, and their use may reduce the time and cost of estimating emissions. However, because they are not based on the emission characteristics of specific facilities, they may produce less accurate results than site-specific factors.
- **Site-specific** emission factors specific to a facility, plant or unit. Site-specific factors must generally be developed for the facility based on historical data. They will tend to provide more facility-specific or operationally appropriate emission estimates, but their derivation and use will be more complex than default factors. The use of site-specific factors is warranted when feasible, as they are generally more accurate than default factors. They should be used in cases where specialized equipment has been developed to fit the specific needs of the facility or project, where the pattern of use of equipment varies significantly from the manufacturer's specifications, or where operating conditions may reduce the accuracy of default factors.

The objective of validating emission factors is to:

- Confirm that the emission factors used meet the requirements of the approved methodology and are appropriate to activity;
- Confirm that the emission factors have been correctly applied from the original documentation to the relevant activity data, and that the most appropriate factors readily available have been selected;
- Where there is a choice among equally defensible emission factors, confirm that the principle of conservativeness has informed the choice of emission factors;
- Where site-specific emission factors have been used, examine the sampling and calculations used to derive them, as well as compare them to known and accepted factors (when available) from independent sources to assess accuracy. Both the source

data and the methodology used to derive site-specific emission factors should be evaluated by the VVB.

## Chapter 6: Validating Other Project Criteria

In addition to the above, the VVB shall review the following elements of the GHG Project Plan to determine their conformity with the requirements of the ACR Standard, any applicable sector standard and the chosen methodology.

### **A. Start Date**

ACR defines the Start Date for all projects other than agriculture, forestry and other land use (AFOLU) as the date on which the project began to reduce GHG emissions against its baseline. ACR defines the start date for AFOLU projects as the date on which the Project Proponent began the activity on project lands, with more specific guidance in the relevant ACR sector standard and methodologies.

To validate the Start Date, the VVB shall review documentary evidence that confirms the project Start Date as described in the GHG Project Plan. Examples of such documentation may include construction and operating permits, contracts, lease agreements, historical operational records, third party reports, etc.

### **B. Crediting Period**

Crediting Period is the finite length of time during which the project's GHG Project Plan is valid, and during which a project can generate offsets for registration on ACR against its baseline. The Crediting Period is defined in each ACR sector standard or approved methodology. It is seven (7) years for non-AFOLU projects, unless otherwise specified in the relevant ACR sector standard or approved methodology. Longer Crediting Periods are allowed for some project types (e.g., some AFOLU activities), while other types have shorter Crediting Periods due to triggers that make the activity no longer surplus to regulations after a certain number of years (e.g., some types of landfill gas collection).

The VVB shall confirm that the temporal boundaries of the GHG project are entirely within the approved Crediting Period timeframe.

### **C. Minimum Project Term**

The Minimum Project Term is the length of time for which a Project Proponent commits to project continuance, monitoring and verification. Minimum project term for different project types

is specified in ACR sector standards. Some project types do not have a minimum term. For project types with a minimum term, the Project Proponent (not necessarily the landowner) commits to continue project implementation, monitoring and verification for the minimum term and signs agreements with ACR to this effect.<sup>12</sup>

The VVB shall confirm whether a Minimum Project Term commitment is required for the project type and if so, confirm that this minimum term is documented in the GHG Project Plan and the agreement between the Project Proponent and ACR.

#### ***D. Offset Title***

The Project Proponent shall provide documentation and attestation of undisputed title to all offsets prior to registration, including chain of custody documentation if offsets have ever been sold in the past. Title to offsets shall be clear, unique, and uncontested.

The VVB shall review the Project Proponent's ownership attestation and supporting documentation that specifies ownership of offsets title and, if applicable, ownership of the emissions sources within the project assessment boundary. Examples of such documentation may include incorporation/joint venture agreements, financial/SEC reports, contracts, lease agreements, purchase orders/invoices/receipts, agreements with the landowner specifying ownership of offsets, etc.

For some project types, e.g. AFOLU, the Project Proponent and landowner will often be different entities. The Project Proponent need not own the project lands or the GHG sources and sinks thereon, but is required to document that title to both lands and offsets is clear, unique, and uncontested.

#### ***E. Impermanence and Risk Mitigation***

GHG reductions/removals from terrestrial activities are impermanent in the sense that they are subject to some risk of future reversal, including unintentional reversals (e.g., fire, flood, insect infestation etc. for terrestrial projects) and intentional reversals (e.g., landowners choosing to discontinue project activities).

For projects with a risk of reversal of GHG emission reductions/removals, Project Proponents must assess risk using an ACR-approved risk assessment tool. Project Proponents must then mitigate reversal risk by contributing offsets to the ACR buffer pool (either from the project itself,

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<sup>12</sup> E.g. ACR *Forest Carbon Project Risk Mitigation Agreement* and ACR *Buffer Pool Terms and Conditions – Forest Carbon Projects*.

or ERTs of any other type and vintage); by providing evidence of sufficient insurance coverage with an ACR-approved insurance product to recover any future reversal; or by using another ACR-approved risk management mechanism.

The VVB shall review the Project Proponent's project-specific risk assessment, which must be conducted using the *ACR Tool for Risk Analysis and Buffer Determination*, or until the release of this tool, the latest version of the Verified Carbon Standard (VCS) AFOLU Non-Permanence Risk Tool, and the Proponent's chosen risk mitigation mechanism, supporting documentation and analytics.

Note that ACR evaluates the risk analysis and corresponding buffer contribution (if applicable) in the GHG Project Plan. This will be included in ACR's eligibility screening report. The VVB shall independently evaluate whether the risk assessment has been conducted correctly.

#### ***F. Leakage***

Leakage is an increase in GHG emissions or decrease in sequestration outside the project boundaries that occurs because of the project action. ACR requires Project Proponents to assess, account for, and mitigate leakage, and provide documentation to support mitigation assertions. Project Proponents must deduct leakage that significantly reduces the GHG emissions reduction and/or removal benefit of the project. Specific leakage guidance is given in the *ACR Standard*, sector-specific standards and approved methodologies.

The VVB shall confirm that the leakage analysis and leakage deduction in the GHG Project Plan conforms to the requirements of the chosen methodology.

#### ***G. Community and Environmental Impacts***

GHG projects have the potential to generate both positive and negative community and environmental impacts. ACR requires community and environmental impacts to be net positive overall. Prior to registration, ACR requires all projects to document a mitigation plan for any foreseen negative community or environmental impacts. ACR also requires written disclosure by the Project Proponent, in its Annual Attestation, of any negative environmental or community impacts or claims of negative environmental and community impacts. The Project Proponent must document plans for mitigation of any reported negative environmental or community impacts.

To examine a Project Proponent's claims of net positive community and environmental impacts, the VVB shall review publicly available information regarding the GHG project. Examples of

such documentation may include environmental impact assessments, if any; records of stakeholder consultations, if any; results from methodologies and tools used for community and environmental impact analysis.<sup>13</sup>

Net positive impacts, and the adequacy of community impact analysis and/or stakeholder consultations, are subjective criteria difficult to validate and verify. The VVB is therefore not required to provide a judgment on the adequacy of these processes or their qualitative results. The VVB must however confirm that the Proponent has evaluated community and environmental impacts, documented a mitigation plan for any foreseen negative community or environmental impacts, and disclosed any prior negative environmental or community impacts or claims of negative environmental and community impacts.

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<sup>13</sup> The ACR Standard provides references to the Climate, Community & Biodiversity Alliance tools for community & environmental impact analysis. These are optional tools. The ACR Standard does not require Project Proponents to use the CCB Standards.

## Chapter 7: Validation Report

The end product of validation is a Validation Report, which is posted publicly by ACR.

The Validation Report is meant to be a detailed description of the validation activities and conclusions. This report shall:

- Provide the name, address, and other contact information of the VVB;
- Identify the GHG project and crediting period covered;
- Reference the *ACR Standard*, applicable sector standard if any, and approved methodology against which validation was conducted;
- Describe the validation objectives, scope, and activities, including but not limited to evaluation of:
  - Project boundary and procedures for establishing the project boundary;
  - Physical infrastructure, activities, technologies, and processes of the GHG project;
  - GHGs, sources and sinks within the project boundary;
  - Temporal boundary;
  - Description of and justification for the baseline scenario;
  - Methodologies, algorithms, and calculations that will be used to generate estimates of emissions and emission reductions/removal enhancements;
  - Process information, source identification/counts, and operational details;
  - Data management systems;
  - Quality Assurance/Quality Control (QA/QC) procedures;
  - Processes for uncertainty assessments;
  - Project-specific conformance to ACR eligibility criteria, including additionality.
- Describe any issues raised during the validation and their resolutions, including issues that required consultation with ACR and ACR's determinations on these issues, citing the specific communication and date.
- State the VVB's conclusion on the conformance of the GHG Project Plan to the ACR Standard, any applicable sector-specific standard, and methodology chosen.
- Be signed by the lead validator and internal reviewer.

Note that validation and the first verification may be conducted simultaneously, and may be conducted by the same approved VVB. Therefore it is acceptable to combine the validation and verification reports (see chapter 12 for contents) into a single report. If validation is conducted separately, the validation report should include the above information.

## Chapter 8: Verification Overview

This chapter summarizes the objectives and scoping elements of verification necessary to register GHG project net emissions reductions/removals as Emission Reduction Tonnes (ERTs). ACR's verification requirements are built on the foundation of the International Organization for Standardization (ISO) 14064 Part 3: *Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions*.

### **A. Definition**

Verification is the systematic, independent, and documented process for the evaluation of a GHG assertion against specific criteria. The verification process is intended to assess the degree to which a project has correctly quantified net GHG reductions or removals per the validated GHG Project Plan, correctly utilizes ACR methodologies and tools, and continues to meet applicable ongoing requirements of the *ACR Standard* and sector-specific standard. A successful verification provides reasonable assurance that the GHG assertion is without material misstatement.

### **B. Objectives of Verification**

The overall goal of third-party verification is to review impartially and objectively a Project Proponent's claimed GHG emission reductions/removal enhancements against the relevant ACR standard(s) and the approved methodology. The VVB must independently evaluate the GHG assertion, based on supporting evidence and GHG verification best practice.

The objectives of verification are to evaluate:

- Reported GHG baseline, project emissions and emission reductions/removal enhancements, leakage assessment, and impermanence risk assessment and mitigation (if applicable);
- Any significant changes to the project procedures or criteria since the last verification;
- Any significant changes in the GHG project's baseline emissions and emission reductions/removal enhancements since the last verification.

The VVB shall review the GHG Project Plan, GHG assertion, and any relevant additional documentation provided by the Project Proponent to determine:

- That the reported emissions reductions and /or removal enhancements are real;
- Degree of confidence in and completeness of the GHG assertion;

- Eligibility for registration on ACR;
- Sources and magnitude of potential errors, omissions, and misrepresentations, including:
  - Inherent risk of material misstatement;
  - Risk that the existing controls of the GHG project will not prevent or detect a material misstatement.

### **C. Scope of Verification**

Verification shall include examination of some or all of the following elements of a GHG Project Plan.

- Physical infrastructure, activities, technologies, and processes of the GHG project;
- GHG sources, sinks and reservoirs within the project boundary;
- Temporal boundary;
- Baseline scenarios;
- Methodologies and calculations used to generate estimates of emissions and emission reductions/removal enhancements;
- Original underlying data and documentation as relevant and required to evaluate the GHG assertion;
- Process information, source identification/counts, and operational details;
- Data management systems;
- Quality Assurance/Quality Control (QA/QC) procedures and results;
- Processes for and results from uncertainty assessments;
- Project-specific conformance to ACR eligibility criteria.

The VVB shall examine the reported data, quantification methodologies, calculation spreadsheets or databases, source data, project data management systems, data quality controls in place, measurement and monitoring systems, and records pertaining to emissions quantification. Calculation and error checks, field/facility surveys, and data trail audits shall be performed to the extent necessary for the VVB to develop an understanding of how data are collected, handled, and stored for a specific project.

### **D. Interval of Verification**

The *ACR Standard* requires:

- A desk-based verification audit at each request for issuance of new ERTs. This is generally annually, but may be more or less frequent at the discretion of the Project Proponent;
- A full verification including field visit at the first verification and again at least every five years. ACR may require field verifications to be conducted more frequently, e.g. in the case of changes in monitoring and data management practices, or for particular project types with material parameters that can only be verified on site. However for all project types field verification is required at minimum every five years;<sup>14</sup>
- Following any reversal of sequestration that requires updating the project baseline.

If the Project Proponent selects a different VVB in the interval between field verifications, the new VVB shall continue desk audits until the next required field verification.

### ***E. Level of Assurance***

ACR considers verification to be a risk-based process in which the VVB examines a sufficient amount of information, informed by the VVB's professional judgment, to provide a reasonable level of assurance that the GHG assertion is free of material misstatement and provides a true and fair representation of the project's net GHG emission reductions/removal enhancements.

ACR requires all verification statements to provide a reasonable (as opposed to absolute or limited) level of assurance. The required wording of Verification Statements is given in Chapter 12. Under this level of assurance, a GHG assertion is deemed materially correct, and a fair representation of the GHG data and information. This also indicates that the GHG assertion is prepared in accordance with the *ACR Standard*, any relevant ACR sector standards and ACR-approved methodologies.

### ***F. Materiality***

A material misstatement is an inaccurate assertion of an offset project's GHG emission reductions/removals, which may reasonably be expected to influence decisions or actions taken by the users of the GHG project information. To accept a verification statement, ACR requires that discrepancies between the emission reductions/removal enhancements claimed by the Project Proponent and estimated by the VVB be immaterial, i.e. be less than ACR's materiality threshold of  $\pm 5\%$ .

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<sup>14</sup> Subject to the clarification that verification is only required prior to issuance of ERTs. If the Project Proponent (e.g. of an Afforestation/Reforestation project) does not seek ERT issuance for longer than five years after the Start Date, the Proponent is not required to verify until the first request for ERT issuance. Once this first verification takes place, subsequent field verifications must occur at least every five years.

Individual or aggregation of errors or omissions greater than the ACR materiality threshold of  $\pm 5\%$  require re-stating before a verification statements will be accepted. Individual and aggregation of errors or omissions greater than  $\pm 1\%$ , but less than  $\pm 5\%$ , must be qualified in the verification statement but do not require re-stating.

### **G. Materiality vs. Precision**

Distinct from the concept of materiality is the precision of GHG estimates. Materiality dictates that the individual or aggregation of errors and omissions exceeding the  $\pm 5\%$  materiality threshold requires restatement (i.e. correcting of material errors) prior to ERT issuance.

For precision, ACR prescribes a target for the final calculation of GHG emission reductions/removal enhancements, and requires an uncertainty deduction if this target is not achieved. This is to provide flexibility to the Project Proponent, in the case that the costs of additional sampling to achieve the precision target outweigh the benefits of not having to take a deduction. The relevant text is reproduced here:<sup>15</sup>

*ACR sets a precision target of  $\pm 10\%$  of the mean at 90% confidence, applied to the final calculation of emission reductions/sequestration. If the Project Proponent cannot achieve precision of  $\pm 10\%$  of the mean at 90% confidence, then the reportable amount shall be the mean minus the lower bound of the 90% confidence interval, applied to the final calculation of emission reductions/removal enhancements.*

The conservativeness principle dictates that if projects cannot achieve the precision target, then:

- For activities reducing emissions, proponents should report the lower bound of the confidence interval on baseline emissions and the upper bound of the confidence interval on project emissions.
- For activities enhancing terrestrial sequestration, proponents should report the upper bound of the confidence interval on baseline sequestration and the lower bound of confidence interval on project sequestration.

This approach will minimize the potential that measurement uncertainty causes an overestimation of net emission reductions/removals.

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<sup>15</sup> See the *ACR Standard* and *ACR Forest Carbon Project Standard*.

Thus uncertainty may be greater than  $\pm 5\%$ , and may not be possible to reduce cost-effectively. In such cases, provided there are no material errors or misstatements exceeding the ACR materiality threshold, the project may be registered but with the uncertainty deduction.

Since ACR requires that all projects use both an approved methodology and meet the requirements of the *ACR Standard* and any applicable sector standard, all projects must adhere to these uncertainty requirements (achieve precision of  $\pm 10\%$  of the mean at 90% confidence, or else report the mean minus the lower bound of the 90% confidence interval), even if the approved methodology does not specify calculation of uncertainty.

## Chapter 9: Verification Activities

This chapter provides an overview of the activities to be performed and information and documentation to be reviewed by the VVB.

### **A. Information/Records to be Reviewed**

Examples of the types of GHG information and records to be reviewed by the VVB include:

- GHG Project Plan;
- GHG assertion;
- Previous verification reports and statements;
- Validation report;
- Operational and control procedures and records for ensuring GHG data quality;
- Documentation of GHG sources and sinks;
- Documentation of quantification methodologies;
- Documentation of monitoring and measurement systems.

Verification of source-level data and records shall include the following activities:

- Determine whether the data used are appropriate and sufficient to allow for the accurate calculation or estimation of GHG emission reductions and/or removals;
- Confirm that the appropriate methodology was used for those data which were estimated as indicated in the GHG Project Plan. Confirm that the units of measure used are correct, appropriate, internally consistent, and consistent with the *ACR Standard*, including raw data recorded in the data collection process and data stored in the project spreadsheet or database/management system and used in calculations. Confirm that any unit conversions have been made correctly;
- Confirm that there are no missing data unaccounted for and that all data have been entered properly.

### **B. Data Assessment and Management Systems**

It is important for the VVB to develop an understanding of the GHG project data collection and management system and processes. The VVB should examine the process flow for collecting and processing activity or monitoring data. This will enable the tracing of data or references from their original root source to the final emissions data entered into the GHG assertion.

The VVB shall assess the project GHG data management system and its controls for sources of potential errors and omissions, including the following:

- Selection and management of GHG data and information;
- Processes for collecting, processing, aggregating, and reporting;
- Systems and processes to ensure accuracy;
- Design and maintenance of the GHG data management system, including systems and processes that support it.

Results of this GHG data management system assessment and its controls shall be used by the VVB to modify the sampling plan, as needed.

The VVB shall review data management system documentation that describes the process of data collection, entry, calculation, and management. This will allow evaluation and cross-checking of factors, activity data, calculations, and estimates in the data system. Such data management system elements to review may include:

- Data manager;
- Emissions source type;
- Units of measure;
- Periodicity of data monitoring/collection;
- Data granularity and degree of aggregation;
- File type/format;
- Method of transfer;
- Assumptions;
- Calibration records.

The VVB should assess the effectiveness of methods for data collection and processing, identify likely areas for data corruption or potential errors, and characterize GHG data collection and management system integration weaknesses.

### ***C. Collection of Evidence***

Verification of GHG projects shall involve collecting the following types of evidence:

- Physical evidence: direct observation of equipment or processes, to demonstrate that relevant data is being collected by the Project Proponent (relevant for field verifications only);

- Documentary evidence: paper or electronic records, including procedures, logs, invoices, analytical results, etc.;
- Testimonial evidence: interviews with knowledgeable personnel (e.g., technical, operations, managerial, etc.).

#### ***D. Data Sampling Plans; Risk-Based Approach***

Since it is generally impractical to assess in detail all GHG information collected by the Project Proponent, especially when the project assessment boundary includes many different sites, only a subset of the operations will be under the VVB's scrutiny. Thus a key element of a successful verification is the sampling and examination of the sites/operations and sources which are not chosen to undergo full field audits, but instead undergo only a desktop review.<sup>16</sup>

A risk-based approach, based on considerations of inherent, control, and detection risks, should be used to determine the intensity of sampling needed to collect adequate evidence to support the required level of assurance. Sampling plans shall take into account the following:

- Level of assurance targeted;
- Verification scope and criteria;
- Amount and type of evidence necessary to achieve the required level of assurance;
- Materiality threshold;
- Complexity of quantification methodologies;
- Quality and completeness of emissions factors and activity data;
- Method for determining representative data samples;
- Risks of material errors, omissions, or other discrepancies.

The implementation of a verification plan should be treated as an iterative process, as the sampling plan or other aspects may need to be modified when weaknesses in controls, GHG information, and materiality issues are identified during the verification. Revisions to the verification plan should consider the sufficiency and appropriateness of evidence from testing methodologies, together with any control evidence to support the project's GHG assertions.

Regardless of the type of verification to be performed, in nearly all cases the VVB will examine only a subset of the entire population of project data. The total amount of data available will

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<sup>16</sup> Even at intervals when verification includes a field visit it may be impractical to review all sites, landholdings, operations and data. In all cases a risk-based approach as described in this section should be applied. Additional guidance is provided in sector-specific standards for cases in which the VVB may visit only a subset of project sites (e.g. in the *Forest Carbon Project Standard*, with regard to verification of aggregated forestry projects).

often be too large to allow for a complete and comprehensive examination of all data. An exhaustive review of all supporting data may also be unnecessary for verification. For example, a Project Proponent may utilize summary data that have been aggregated, in which case the review of data management procedures and systems may be more important than the examination of all of the original unprocessed data. These concerns are particularly significant in the case of activity data, which may encompass hundreds or thousands of records for a wide range of sources over multiple years.

The design of a sampling plan typically involves three steps: (1) the selection of an appropriate group of facilities to undergo field site survey audits (as applicable), with initial GHG project verification requiring a field site survey audit at the project location; (2) the selection of an appropriate subset of data and issues to be examined during the field or desk audit; and (3) if applicable, the selection of issues and data to examine from any facilities that are not selected for a focused field audit.

The proper selection of the sample of data to be examined is a crucial step in preparing a verification plan. The amount and types of data selected for examination is ultimately at the professional judgment of the VVB. Sufficient information must be examined for the VVB to make a credible statement regarding the quality of the project's data, data collection and management procedures, quantification methods, and related processes, balanced with considerations of time and cost. It is important for the VVB to prioritize and carefully select sample data and other issues to investigate. This can be done through data sampling, a process that allows the VVB to form an opinion on the data as a whole. To draw reasonable conclusions, the sample data must be representative of the total data.

#### ***E. Field and Desktop Data Audits***

During the verification planning process, the VVB must identify the key variables that have the potential to cause a material misstatement in the GHG assertion. The VVB should seek to understand what types of emission sources and sinks are present, what types of data management systems are used, and what types of management structures are present in the Project Proponent's company and at the project site/facility. The purpose of this profile analysis is to identify and characterize individual sources of emissions project-wide, and to categorize emissions at the facility level according to the key verification parameters. Once the emission sources have been characterized, the VVB next assesses the types of data management systems and management systems used by the Project Proponent.

The selection of data to be reviewed in a field or desktop audit shall be based upon the following:

- The number of data points or facilities within the database;
- The degree of data variability;
- The degree of missing/estimated data.

VVBs should not be limited to only the above criteria when selecting facilities and data sets for field and desktop audits. Expert judgment should be exercised to ensure that a representative sample of data sets is selected and reviewed.

#### ***F. Error Checking/Testing***

Methods for checking for potential errors associated with GHG information can be categorized into input, transformation and output controls. Each category is described below, with the applicable error checking tests to be used by the VVB.

a) Input controls: procedures for checking the data from the measured or quantified values to a project database, and to original records. Tests for accuracy include:

- Record count – ensuring the number of data entries matches the number of units/sites reported in the GHG Project Plan;
- Valid character tests – ensuring the data entered are in relevant format; checking for improperly entered data;
- Missing data tests – scanning for empty cells within the GHG database that are not accounted for;
- Limits and reasonableness tests – comparing the data with predetermined limits as a reasonable test.

b) Transformation controls: checking for errors during the process of collating, transferring, processing, calculating, estimating, aggregating, disaggregating or adjusting input data. Tests for accuracy include:

- Consistency tests – ensuring the methodologies and data handling process are consistent throughout project reporting;
- Re-computation tests – recalculating conversions, estimations, etc. using the same data and methodology provided in the database output;
- Cross-checking tests – comparing reported results with other known results and alternative quantification methodologies.

c) **Output controls:** control surrounding the distribution of GHG information and comparisons between input and output information. Tests for accuracy include:

- Matching input with output – verifying that the data entered into the GHG database match the results presented in the GHG report.

Where applicable and available, the following types of cross-checking procedures will provide greater assurance that the reported GHG information is within the expected range. Significant departures should be investigated.

- Internal checks within a process: compare current-year emission reductions with previous year, noting any changes to the size or usage capacity of the site;
- Checks within a sector/national grid: e.g., check to see if the emission rates of the sites are comparable with the regional average emission rates published by the applicable regional grid authority;
- Checks against international information, e.g., IPCC's typical emission intensity figures for different technologies in different countries.

### ***G. Verification of Quantification Methods and Data Sources***

The objectives for verification of quantification methods are to:

- Identify quantification errors in overall GHG project emissions, identify any outliers in facility-level and temporal boundaries results, and detect any methodology inconsistencies;
- Ensure the appropriateness of the estimation methodology applied to the GHG project-specific situation, based on size of the sources, data availability, and associated levels of uncertainties;
- Review calculations and quantification methods used in the GHG Project Plan and/or GHG assertion to determine if results reported reflect emission estimation approach and supporting data;
- Examine quantification method documentation at the facility/source level, reviewing key facility-specific results, calculations, emission factors, and assumptions to determine validity of the quantification method;
- Examine the reported levels of accuracy and uncertainty of the emission estimates;
- Verify application of the quantification methodology by examination of supporting evidence for key selected facilities and major sources;
- Review methods, underlying data/assumptions, reference citations, and data management systems, from project roll-up to individual source root data, with field audits

and use of external data and third party records to confirm reported GHG emissions and reductions results;

- Determine accuracy of quantification data and whether metering and monitoring equipment operate within acceptable limits;
- Conduct desk audits of data and calculations for a select number of facilities or landholdings not included in field verification.

The process for verification of quantification methodologies may include the following activities, data, and evidence (as informed by the VVB's professional judgment; not all are required):

- Review spreadsheets and aggregated data used to create estimates of GHG emission reductions and removal enhancements;
- Review activity data and emission factors to evaluate whether the data used are appropriate for the associated activities, and sufficient to provide a reasonable estimate of the emissions from the source category;
- Identify any missing or incomplete data. In cases where a large number of data records exist and have been aggregated, the VVB should review data management practices used to compile final aggregated data;
- Evaluate trends in calculated GHG emissions over multiple data collection and reporting periods, including comparison against relevant production data at the facility level;
- Evaluate how data are collected and aggregated, including desktop data reviews of some key individual source data at select facilities, comparing against aggregated totals;
- Perform field audit verification activities, potentially including:
  - Key personnel interviews (data management specialists, process engineers, monitoring maintenance personnel, etc.);
  - Raw data recording, daily/monthly rollups, and data transfer practices;
  - Meter calibration, maintenance records and frequency;
  - Root data, quantification methods, and analytical results;
- Review key meter/instrument calibration and maintenance logs to determine adherence to QA/QC procedures;
- Perform re-computation checks for accuracy of calculations and algorithms;
- Check validity of detailed calculations, assumptions, and emission factors;
- Check spreadsheet and database calculations;
- Cross-check monitoring data with site-specific emission factors, fuel use data, and material/energy balance engineering calculations. Databases, reports, and other information systems should be checked, and manually recorded data logs, hand calculations, and spreadsheets checked in the field and compared against inventory data;

- Review original data records and audit trail, identify errors and omissions in reported GHG data and ensure accurate reporting (e.g., energy use verified by energy supplier data such as fuel shipment bills of lading, invoices, utility bills, fuel analysis reports);
- In cases where data values can be expected to vary or be updated over the project Crediting Period, confirm that data have been adjusted accordingly;
- In cases where a single category of a data type has been estimated using several different sources, confirm through interview that double-counting or omission has been avoided;
- When data type calculations incorporate several interrelated parameters, review to ensure that they have been calculated appropriately;
- Evaluate whether the most accurate and appropriate data types readily available were used, which may be affected by factors such as facility location, ambient operating conditions, choice of measure (e.g. default vs. specific factors), etc. Identify and evaluate notable outlier data;
- Compare data to known and accepted external sources to assess accuracy and appropriateness;
- Evaluate whether the ISO principle of conservativeness has been applied in the choice of assumptions, calculation methods, emission factors etc.

#### ***H. Verification of Leakage Assessments***

Leakage is a decrease in sequestration or increase in emissions outside project boundaries as a result of project implementation. Leakage may be caused by shifting of the activities of people present in the project area, or by market effects whereby emission reductions are countered by emissions created by shifts in supply of and demand for the products and services affected by the project.

Some ACR-eligible project types require leakage to be assessed and if significant, deducted from the calculation of net emission reductions. Requirements to assess and deduct leakage will be included in the ACR-approved methodology.

Verification of estimates of leakage as part of a GHG project verification is integrally related to the validation of project assessment boundaries per Chapter 3. The VVB shall use the results of the project assessment boundaries validation, the Project Proponent's estimation of the GHG project leakage, ACR sector standards, leakage guidance in the approved methodology, and the VVB's sectoral knowledge to make an independent assessment of leakage. If there is a material discrepancy between the leakage assessment and deduction included in the GHG

Project Plan or GHG assertion and the VVB's independent assessment, this discrepancy must be resolved with the Project Proponent and corrected prior to ERT issuance.

# Chapter 10: Verifying Aggregated AFOLU Projects

Aggregation – the pooling of activities on more than one landholding or project site into a single GHG project – is an important mechanism to make it feasible for smaller landowners to participate in carbon markets. Aggregation may provide transaction cost efficiencies for initial inventory, monitoring and verification, as well as diversify risk. ACR does not require aggregation or discourage any landowner from bringing a project to ACR directly, but recognizing the increasing prevalence of aggregated projects, provides guidelines to Project Proponents aggregating multiple landowners.

Guidance for aggregated projects is provided in, for example, Chapter 7 of the *ACR Forest Carbon Project Standard*. This chapter reiterates the portions relevant to verifying aggregated forest carbon projects. Other aggregated AFOLU projects will be treated similarly from a verification perspective.

## **A. Verification of Aggregated Projects**

ACR applies its requirements for initial inventories, monitoring and verification at the level of the overall project whether this is a single large landholding or an aggregated group of smaller landholdings.

The field verification every five years should include such measurements as the VVB requires to provide a reasonable level of assurance that the GHG assertion is without material discrepancy as defined by ACR. ACR expects the VVB to conduct a risk-based assessment of the probability that verified GHG reductions/removals will be materially different from those reported by the Project Proponent. For aggregated landholdings, an initial random sample may be sufficient to detect whether more intensive sampling is required to verify the GHG assertion at the ACR materiality threshold. The VVB may randomly select a subset of the project for field verification, then if any discrepancies are discovered in the initial selection, visit additional properties to investigate further. ACR does not require the VVB to visit every landholding or to conduct any minimum number of measurements, provided the GHG assertion for the overall project can be verified at a reasonable level of assurance and the verification statement worded accordingly.

## **B. Programmatic Project Development Approach**

Related to but distinct from aggregation is the concept of a programmatic approach to project development. While an aggregated project may include a variety of lands but all with the same

overall baseline and Start Date, a programmatic approach adds the further nuance of incrementally adding lands into the project over time. This is important for flexibility but makes project design, baseline definition, Start Date, Crediting Periods, monitoring and verification more complex.

A programmatic aggregated project is treated as a single project with an overall baseline and monitoring/verification plan. The methodology for such projects will need to establish applicability conditions and procedures for the addition of new lands to the program, so that it does not become necessary to re-define the baseline each time a new landholding is added. Individual landholdings within the programmatic project may have different Start Dates, resulting in multiple Crediting Periods within the project. This will require the Proponent to design a clear plan and schedule for project accounting, monitoring and verification. Practical and cost considerations may dictate that each project be limited to a single geographic region and relatively similar land types, and that new lands be added at the required verification interval every five years.

For verification purposes, programmatic projects are treated like an aggregated project with Start Dates corresponding to the five-year full verification interval. A field verification should occur no less frequently than 5 years after the Start Date of each phase of the programmatic project, as defined in the validated GHG Project Plan.

The VVB should conduct such measurements as the VVB requires to provide a reasonable level of assurance that the GHG assertion is without material discrepancy. The VVB may randomly select a subset of the project for field verification, then if any discrepancies are discovered in the initial selection, visit additional properties to investigate further. ACR does not require the VVB to visit every landholding or to conduct any minimum number of measurements, provided the GHG assertion for the overall project can be verified at a reasonable level of assurance and the verification statement worded accordingly.

# Chapter 11: Quality Assurance, Quality Control and Uncertainty

The Project Proponent shall establish and apply quality assurance and quality control (QA/QC) procedures to manage data and information, including the assessment of uncertainty, relevant to the baseline and project scenarios. QA/QC procedures and the minimization of overall uncertainty are integrally related to the level of assurance required for verification, the materiality of sources included in the GHG assessment boundary, and the risk of material misstatements.

## **A. Sources of Uncertainty**

A key element of a GHG emission reduction project QA/QC program is the assessment of uncertainty. Significant sources with the largest uncertainty in their emission estimates should be targeted for improvements. The goal of this iterative QA/QC process is to minimize overall uncertainty in the reported GHG information.

Uncertainty is defined as a statistical parameter associated with the result of a direct measurement or indirect quantitative estimate which characterizes the dispersion of the values which could be reasonably attributed to the measured/estimated quantity, e.g., the sample variance or coefficient of variation. For GHG emissions and reductions estimates, it refers to the lack of certainty in emissions-related data resulting from factors such as:

- Application of non-representative or inaccurate quantification methodologies or emission factors;
- Incomplete data on, or omission of, material sources;
- Lack of transparency;
- Measurement accuracy or error;
- Weaknesses in data management systems in place to control data quality.

Reported uncertainty typically specifies a quantitative estimate of the likely difference between or dispersion among reported values, and a qualitative description of the likely causes of said differences. Quantitative uncertainty estimates performed according to the “*Guide to the Expression of Uncertainty in Measurement (GUM)*” (ISO 1995; updated 2008), or a similar methodology, are recommended for those GHG emission reductions/removal enhancements whose estimation methodologies do not include multiple measurements that allow quantification

of confidence intervals. These quantitative uncertainty estimates are an integral component of the ACR verification process.

The major sources of uncertainty associated with GHG emissions estimates include:

- Estimation or model: quantification methods and mathematical equations;
- Parameter: quantifying parameters in method (emission factor, activity data);
- Systematic: estimation bias (e.g., non-representative data, faulty equipment);
- Statistical: random variability of sample data;
- Project baseline: associated with assumptions used in development of baseline scenarios, projecting a set of circumstances possibly not likely to occur (technology, performance, timing, equivalent services uncertainties).

If adequate data are not available to quantify these uncertainties, expert judgment is often used to estimate them. GHG data uncertainties should be addressed in the QA/QC procedures, and assessed by the VVB for adequacy and implementation results. Methods for estimating GHG emissions uncertainty to be assessed by the VVB may include:

- Qualitative discussion: sources listed and relative magnitude of uncertainties discussed;
- Subjective data quality rankings: rankings based on professional judgment assigned to each key emission factor and activity parameter;
- Data attribute ranking system: relative uncertainty numerical value criteria;
- Expert estimation used to estimate uncertainty;
- Propagation of errors: statistical techniques applied to expert estimates;
- Direct simulation: Monte Carlo or other numerical modeling methods.

It is the VVB's role to assess which GHG uncertainty analysis method was utilized in the project's QA/QC program, its appropriateness for data quality objectives and end use, and its results. In all cases, the VVB should confirm that the appropriate uncertainty assessment procedures have been used.

## ***B. QA/QC Procedures***

QA/QC procedures are critical to estimating GHG reductions over time. The nature and extent of QA/QC activities, and whether or not the Project Proponent implements a formal QA/QC plan, will vary depending on the end uses of the reported GHG data. The VVB's role is not to develop a GHG emissions reductions QA/QC plan as part of the verification, but rather to verify:

- The existence of QA/QC procedures for each of the major data gathering and processing steps, and general areas of conformance and non-conformance with said QA/QC procedures;
- The appropriateness of the QA/QC procedures or plan, with respect to its design and elements, and their relationship to the GHG project applications for the reported GHG emissions data;
- The existence of a QA/QC plan and/or documented QA/QC procedures either developed specifically for the GHG project, or developed for more general environmental or financial programs and applied to the GHG project;
- The actual application of QA/QC procedures as part of the GHG project emissions reduction activities, and availability of QA/QC results for review by the VVB.

A primary objective of QA/QC procedures is to identify the sources of error or uncertainty in both the data and data management system(s), and to reduce uncertainty and improve data quality. Verification activities should take advantage of any available results from the Project Proponent's ongoing QA/QC program, as it relates to emission reductions/removal data. QA/QC activities performed by the Project Proponent should provide reference data against which the VVB can check results of the verification and use as input to help plan for and guide execution of the verification activities.

QA/QC activities should be designed to address emissions estimation uncertainty and data quality. The uncertainty associated with the VVB's assessment of risk is reflected in the degree of confidence stated in their assertion: the greater the uncertainty, the lower degree of confidence in the reported results and, hence, a higher concern about risk.

QA/QC procedures for GHG projects will vary, ranging from institutional knowledge of the Project Proponent, to documented general QA/QC procedures, to a formal written QA/QC plan. Elements of a reporting party's QA/QC program that may be assessed include (as informed by the VVB's professional judgment; not all are required):

- Identify whether definitions of data quality objectives exist and are consistent with end uses of the reported GHG data;
- Determine if major sources of uncertainty have been identified, and whether an approach to reduce uncertainty and improve the quality of reported results has been developed and implemented;
- Confirm that applicable QC and independent QA activities have been performed;
- Confirm that data collection and management processes, and QA/QC procedures have been properly implemented;

- Confirm that QA/QC results and resolution of problems have been adequately documented, and results communicated to the GHG project team;
- Determine the degree to which any existing data quality objectives have been met, including assessments of accuracy (or uncertainty) of estimates, data completeness, representativeness, aggregation/disaggregation, comparability/consistency, and documentation;
- Ensure the reasonableness of data and emissions estimates, validity of assumptions, methodology, and data used, and algorithmic correctness.

QA/QC methods and results assessed by the VVB may include (as informed by the VVB's professional judgment; not all are required):

- Reality checks: compare data or estimate to a standard reference value, estimates for similar sources, expert judgment on reasonableness of value;
- Peer review: checklist of elements covered by peer review, written reviewer comments identifying issues;
- Sample calculations: replication of a complete calculation set, hand replication of most complex calculations, hand calculation using a different method;
- Computerized checks: review built-in QA/QC functions, variable type and value range checks, look-up tables, cell dependency, cell precedence, and error identification;
- Sensitivity analysis: focus on key variables and effects on results, of emissions models and previous inventories/sensitivity analyses;
- Statistical checks: descriptive statistics, outlier detection for range checks;
- Independent internal reviews: evaluation to determine data quality, confidence in accuracy and completeness of results, and QC effectiveness;
- Emission estimation comparisons: comparison of estimated emissions to real-world measurements (or their surrogates).

# Chapter 12: Verification Statement and Verification Report

The end products of verification are a Verification Statement and Verification Report. Both are posted publicly by ACR.

## **A. Verification Statement**

The Verification Statement is meant to be a brief statement of the VVB's opinion of the GHG assertion. This statement shall:

- Be addressed to the ACR Chief Technical Officer;
- Provide the name and contact information of the VVB;
- Include an introductory paragraph:
  - Identifying the reporting period covered by the verification;
  - Referencing the *ACR Standard*, applicable sector standard if any, and approved methodology against which the verification was conducted.
- State the quantity of GHG emission reductions or removal enhancements in the GHG assertion for the reporting period;
- State the VVB's conclusion on the GHG assertion, including any qualifications or limitations. For acceptance by ACR, the Verification Statement shall confirm that the GHG assertion is without material discrepancy, as defined by ACR, and that the verification activities provide a reasonable level of assurance;
- Be signed by the lead verifier and internal reviewer.

## **B. Verification Report**

The Verification Report is meant to be a more detailed description of the verification activities, corrective actions, and conclusions. This report shall:

- Provide the name, address, and other contact information of the VVB;
- Identify the GHG assertion verified and reporting period covered;
- Reference the *ACR Standard*, applicable sector standard if any, and approved methodology against which the verification was conducted;
- Describe the verification objectives, scope, and activities, including but not limited to:
  - GHG information or performance data verified (e.g., baseline GHG emissions, project GHG emissions, GHG emissions reductions and/or removal enhancements);

- Techniques and processes used to test the GHG information and associated GHG assertion;
- The results of quantitative uncertainty assessment and analysis of the quantification methodologies and applicable data sets and sources;
- Whether the data and information supporting the GHG assertion were based on assumptions and industry defaults, future projections, and/or actual historical records;
- Describe the leakage assessment if required;
- Describe any issues raised during the verification and their resolutions, including issues that required consultation with ACR and ACR's determinations on these issues, citing the specific communication and date.
- For projects requiring Project Proponents to assess risk of reversal and apply an ACR-approved risk reversal mechanism, include the VVB's opinion on the risk assessment;
- Describe the level of assurance;
- State the VVB's conclusion on the GHG assertion, including any qualifications or limitations. For acceptance by ACR, the Verification Statement shall confirm that the GHG assertion is without material discrepancy, as defined by ACR, and that the verification activities provide a reasonable level of assurance;
- Be signed by the lead verifier and internal reviewer.

Note that validation and the first verification may be conducted simultaneously, and may be conducted by the same approved VVB. Therefore it is acceptable to combine the validation (see chapter 7 for contents) and verification reports into a single report. If verification is conducted separately, the verification report should include the above information.

## Chapter 13: VVB Requirements

This chapter reiterates information provided on [www.americancarbonregistry.org](http://www.americancarbonregistry.org) on current requirements for ACR-approved validators and verifiers. The information at that location – the current list of approved VVBs, accreditation and other requirements of VVBs, VVB application process and fees, and conflict of interest requirements – supersedes the information in this chapter in the case of any conflicts.

### **A. Requirements of Project Validators and Verifiers**

VVBs shall be accredited for project validation and verification in the scope of the applicable methodology, and VVB teams shall meet the competence requirements as set out in ISO 14065:2007. All ACR validators and verifiers must either be ANSI accredited<sup>17</sup> in the applicable sectoral scope, or be Designated Operational Entities approved under the Clean Development Mechanism or Accredited Independent Entities approved under Joint Implementation, regardless of ANSI accreditation. All entities must submit required documentation for ACR approval prior to conducting work for any project registered or seeking registration on ACR.

ANSI accredits separately VVBs for validation of assertions related to GHG emission reductions & removals at the project level, and verification of assertions related to GHG emission reductions & removals at the project level. However VVBs with ANSI accreditation for validation within the applicable sectoral scope are approved by ACR to conduct verification, and vice versa.

ACR requires that all approved VVBs sign an agreement with ACR, which defines the VVB role and responsibilities, ensuring technical capabilities and no conflicts of interest.

VVBs must also complete a project-specific conflict of interest form prior to completing any work for a project registered or seeking registration on ACR.

The VVB application process is detailed at [www.americancarbonregistry.org](http://www.americancarbonregistry.org).

### **B. Approved VVBs**

See [www.americancarbonregistry.org](http://www.americancarbonregistry.org).

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<sup>17</sup>All ACR VVBs meeting this requirement must be accredited under, or have begun the process of accreditation under, ISO 14065 by the American National Standards Institute (ANSI) no later than December 31, 2010.

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