Urban Forest
Project Verification Protocol

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1 Introduction

The Climate Action Reserve's (Reserve) Urban Forest Project Verification Protocol provides guidance to California Air Resources Board (CARB) and Reserve approved verifiers for verifying greenhouse gas (GHG) emission reductions associated with a planned set of tree planting and maintenance activities to permanently increase carbon storage, in accordance with the Reserve's Urban Forest Project Reporting Protocol. Verification occurs on an annual basis.

This verification protocol supplements the California Climate Action Registry's General Verification Protocol (GVP). It describes the core verification activities in the context of an urban forest project and provides information on project monitoring parameters. The purpose of verification is to provide an independent review of data and information used to produce a GHG project report. It aims to ensure that a participant's emissions report meets the following quality criteria: completeness, consistency, accuracy, comparability and transparency. The intended audience of the project verification protocol is approved verifiers. However, urban forest project developers will also find it useful to review this document to develop a better understanding of the verification activities associated with reporting GHG reductions to the Reserve.

Forest sector verifiers must read and be familiar with the following California Registry and Reserve reporting tools:
- General Reporting Protocol
- Urban Forest Project Reporting Protocol
- General Verification Protocol
- Urban Forest Project Verification Protocol
- The Climate Action Reserve - Online Reporting Tool

The California Registry's general and industry-specific verification protocols are designed to be compatible with each other and are available on the California Registry's website at www.climateregistry.org.

Only CARB and Reserve approved forest sector verifiers are eligible to verify Urban Forest Project reports. Approved verifiers under the California Registry's GVP are not automatically permitted to verify the project reports. To become an approved forest sector verifier, a general verifier must successfully complete a forest sector-specific application process. Information on the application process can be found at www.climateregistry.org.

2 Standard of Verification

The Reserve's standard of verification for Urban Forest GHG projects is the Urban Forest Project Reporting Protocol. To verify a project developer's project report, verifiers apply the verification guidance in the GVP and this document to the standards described in the project reporting protocol. The reporting protocol provides eligibility rules, methods to calculate reductions, performance monitoring instructions, and procedures for reporting project information to the Reserve. The project reporting protocol:
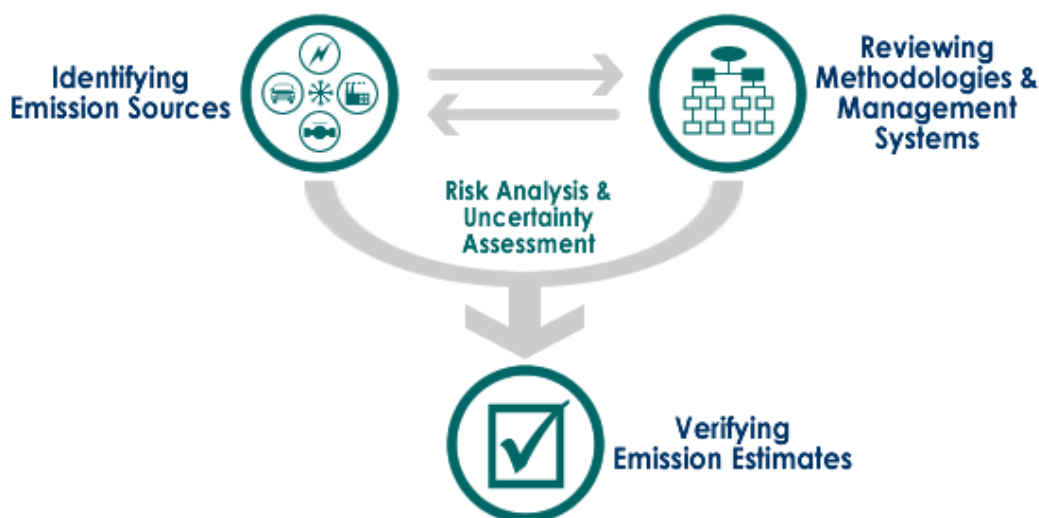
- defines the GHG reduction project,
- defines project eligibility rules,
- delineates the project boundary,
- provides GHG reduction calculation methods,
- identifies procedures for project monitoring, and
- describes project reporting parameters**.**

Specifically, this verification protocol supports the verification of GHG reduction projects associated with a planned set of tree planting and maintenance activities to permanently increase carbon storage that commences operation on or after January 1, 2001.

Project verification occurs annually. GHG reductions associated with carbon sequestration (taking into account GHG emissions from tree care and maintenance) are accounted for on an ex-post basis.

3 Core Verification Activities

The Reserve's core verification activities are a risk assessment and data sampling effort developed to ensure that the risk of a reporting error is assessed and addressed through appropriate sampling and review. An illustration of the core verification process is provided in Figure 1, and a description of the three-step procedure is provided below, which is adapted from the GVP.

Figure 1. The Core Verification Process.

The GHG reduction project's effects are determined within a GHG assessment boundary. The project reporting protocol delineates the GHG sources and gases assessed by project developers to determine the net GHG reductions associated with planting urban trees. The boundary captures sources and sinks, including GHG emissions from fuel combustion in vehicles and equipment used to plant, maintain, and monitor project trees and carbon sequestration in project trees.

Within the defined GHG assessment boundary, project developers quantify the impact of the project on carbon dioxide (CO_2) emissions and removals (sources of methane and nitrous oxide are considered de minimis and excluded from the boundary) by quantifying carbon sequestration and CO_2 emissions associated with "eligible project trees." Eligible project trees are urban trees planted within the physical boundaries of the project (determined by the legal or service-territory boundaries of the project developer) in excess of the performance threshold. Therefore, a project developer's project report will consist of two main parts:

1. A determination of the number of eligible project trees; and
2. An emissions and removals assessment for eligible project trees.

The verification process identifies the emission sources and sinks, reviews data management systems, and verifies emission estimates for both the baseline scenario and the project case to verify the project's GHG effects.

Reserve verifiers apply verification procedures consistently for all project developers.

3.1   Step 1: Identifying Emission Sources and Sinks

Under this step, verification activities for the first year that a project is submitted to the Reserve include the review of project eligibility per the eligibility rules included in the project reporting protocol.

Questions to answer include:
1. Does the project meet the definition of the project as provided in the project reporting protocol?
2. Does the project satisfy the eligibility criteria?
3. Did the project developer sufficiently review and provide compliance with local, state and federal air and water quality regulations?
4. Does the project report include all direct carbon dioxide sources and sinks within the GHG assessment boundary associated with eligible project trees?

In addition, every year a project report is submitted, project verifiers review the GHG emission report and document whether the report reflects the characterization and scope of the urban forest project. Specifically, verifiers review the project developer's determination of eligible project trees and the sources and sinks associated with those trees (carbon sequestration, CO_2 from fuel combustion in vehicles and equipment) to ensure that all sources and sinks are identified for trees that are above the performance threshold.

The project verifier also identifies the relative contribution of GHG sources and sinks to net GHG emission reduction estimates. To do this, verifiers rank the project developer's emission and removal estimates by their relative magnitude in terms of their absolute

value (since removals and emissions have opposite signs). Ranking should first be done at the most aggregate level for the three emission/removal categories (i.e. compare totals for carbon sequestration, vehicle emissions, and equipment emissions). The verifier identifies the category of greatest relative magnitude and disaggregates and ranks the GHG emission/removal estimates for that category by subcategories according to the table below. The verifier may identify additional relevant ways to disaggregate and rank the estimates depending on individual circumstances.

Emission/removal categories	Subcategories
Carbon sequestration	Tree species or species group (allometric equations are specific to tree species or species groups)
Vehicle emissions	Fuel type
Equipment emissions	Fuel type or equipment type

3.2   Step 2: Reviewing GHG Management Systems and Estimation Methodologies

After confirming the scope and comprehensiveness of the project developer's emission sources and sinks and ranking emission/removal estimates, verifiers review the methodologies and management systems that the project developer used to calculate project carbon sequestration and CO_2 emissions. The objective is to assess the appropriateness of the data management systems that provide emission and removal information to the Reserve.

A verifier's review of a project developer's GHG data collection and organization system should consider the following questions:
1. Are CO_2 sources and sinks within the GHG assessment boundary correctly organized by source and sink category?
2. Is the number of eligible project trees estimated correctly (i.e. the number of trees planted within the entity's physical boundary that year, in excess of the performance threshold)?
3. Are the eligible project trees clearly differentiated from non-project trees within the entity so they can be tracked for the duration of the project?
4. Is the Tree Monitoring Plan sufficient for providing carbon sequestration estimates consistent with the uncertainty requirements in the project protocol?
    a. Was one of the three approved measurement and quantification approaches in the protocol used?
    b. Are eligible project trees clearly marked and spatially located?
    c. Were acceptable procedures used to sample (if applicable), measure, and record tree size?
    d. Were appropriate biomass equations used to estimate carbon stocks?
    e. If sampling methods were used, what was the sampling error (if applicable) and are appropriate adjustments made to the carbon stock estimates based on sampling error?
    f. If growth models were used, (i) were they pre-approved models validated for project conditions, and (ii) were individual measurements forecast using growth models for no more than 12 years?
    g. If remote sensing methods were used, were pre-approved regression equations used to convert tree crown diameter to tree diameter? (Note at

the time of publication of the Urban Forest Protocol, pre-approved regression equations for remote sensing were still pending.)

5. Did the project developer correctly estimate and prorate the amount of fossil fuel used to plant and maintain eligible project trees (relative to overall fuel usage for these activities at the entity level)?
6. Did the project developer apply the correct CO_2 emission factors to estimate CO_2 emissions from vehicles and equipment used for tree planting and maintenance?
7. Is the tree maintenance plan complete and does it allow for tracking expenditures to assess leakage? Did expenditure levels in any of the program areas (i.e. tree planting, young tree care, mature tree care, tree removal and administration/other) decrease by more than 10% relative to anticipated levels or levels reported for the prior year? If so, was an explanation provided by the project developer?
8. Were project trees removed during the year? If so, were they replaced with replacement trees?
9. Were project tree sites moved during the year? If so, were the new sites better suited for reducing the risks of tree loss in the future?
10. Were other measures taken to reduce the risks of reversals due to tree losses?
11. Is an individual responsible for managing and reporting GHG emissions? Is this individual qualified to perform this function?
12. Is appropriate training provided to personnel assigned to GHG emission reporting duties?
13. If the project developer relies on external staff to perform required activities, are the contractors qualified to undertake such work? Is there internal oversight to assure quality of the contractor's work?
14. Are appropriate documents created to support and/or substantiate activities related to GHG emission reporting activities, and is such documentation retained appropriately? For example, is such documentation maintained through reporting plans or procedures, fuel purchase records, etc.?
15. Are the mechanisms used to measure and review the effectiveness of GHG emission reporting programs appropriate for this purpose? For example, are policies, procedures, and practices evaluated and updated at appropriate intervals?

Using answers to the above questions as a guide, the verifier assesses the overall risk of misstatement associated with the GHG management systems. To do this, verifiers evaluate the general quality and performance of the management systems and identify areas that could cause concern with data quality.

3.3   Step 3: Verifying Emission Estimates

Based on findings in the steps above, the verifier develops and implements a strategy to further investigate areas that have the greatest potential for material misstatements. By the end of this step, the verifier will either confirm or reject that material misstatement has occurred. This involves (1) site visits to the project headquarters where in-depth review of aspects of the management systems are conducted, and (2) recalculation of a representative sample of the emission/removal estimates for comparison with estimates reported by the project developer.

At least one site visit is required to be conducted during each year of verification activities. While verifiers determine the specific strategy for a site visit, usually such activities include:

- Assessing data control systems.
- Generally attempting to detect material discrepancies by gathering different types of evidence.
- Reviewing documents such as sampling protocols, tree measurement data, and fuel usage records.
- Reviewing how emission and removal estimates are calculated, including choice of equations, emission factors, and software programs used to generate estimates.
- In some cases (e.g. if tree measurement data show discrepancies or unusual trends), the verifier may determine it is necessary to visit and measure a sample of tree sites.

The aim of the core verification activities is to verify the emission and removal estimates. To do so, verifiers re-calculate a subset of the project developer's emissions and removals for eligible project trees and compare the sub-sample re-calculated results with the project developer's calculated results from the same sources and sinks to determine if the GHG emissions inventory is free of material misstatements. Project developers may choose to implement this step preliminarily, before completing the site visit, because the results may influence the priorities of the visit.

Verifiers must compare the emission and removal data and re-calculations to the project developer's emission and removal data and calculations for the same sources and sinks, and complete the following tasks:

1. Assess the areas of greatest impact and uncertainty in the emissions and removals profile. This should be based on the ranked estimates and issues identified in the qualitative review of the GHG management systems.
2. Choose a strategy for recalculating project estimates, which may involve selecting a representative sample of data to recalculate. For example, use all available data to recalculate the category or subcategory that contributes most to net GHG emission reductions or that has the greatest risk of material misstatement due to data management concerns. For all other categories, recalculate emissions/removals using a sub-sample of the data available and extrapolate the estimates to achieve a total estimate of net GHG reductions.
3. Recalculate the GHG emissions and removals according to the strategy. This may involve acquiring additional information from the project developer.
4. Compare estimated GHG emissions and removals associated with project trees to those of the project developer to determine if any material misstatements exist.

Verifiers should concentrate their activities in areas that have the greatest impact to the net change in emissions due to planting and maintaining trees. The verification of emission estimates should document the answers to the following questions:

1. Have you documented your process for determining the appropriate sampling plan?
2. Have you performed data triangulations where possible? Where more than one set of data is available for calculating emissions and removals, a comparison can be performed as a check of the reported emissions and removals.
3. Are the current year's reported emissions and removals associated with eligible project trees significantly different from the prior year's emission and removal levels? If so, do you understand the reasons for the changes and, to the best of your knowledge, do they explain the differences in emissions and removals?

4. Are there any discrepancies between your emission and removal estimates and the participant's material?

It is possible that during this process differences will arise between the emissions and removals estimated by the project developer and those estimated by the verifier. Differences of this nature may be classified as either material (significant) or immaterial (insignificant). If verifiers discover reporting errors, they must determine if these errors, when extrapolated throughout the entire project, will result in a material misstatement. This is typically achieved by performing a sensitivity analysis on the error with respect to the total reported emissions and removals. A discrepancy is considered to be material if the overall reported emissions or removals differ from the overall emissions or removals estimated by the verifier by 5% or more. A difference is immaterial if the difference is less than 5%.

4 Completing the Verification Process

The GVP provides general instructions for verifiers to finalize the verification process. It describes completing a Verification Report, preparing a Verification Opinion, conducting an exit meeting with the participant, and notifying the Reserve of the participant's verified status. Verifiers are responsible for applying the guidance in a manner that meets the goals of project verification.