Credit Class

GHG & Co-Benefits in Watershed Carbon

Ecosystem focus: Watersheds

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1. Introduction

This Credit Class can be used by Project Proponents to reduce nonpoint source contamination of watersheds, thereby avoiding greenhouse gas emissions from electricity use, consumables, and infrastructure construction through reduced energy demand associated with downstream drinking water, wastewater, and stormwater management and treatment.

While green infrastructure is often more affordable than gray infrastructure, it is not in fact the preferred solution by most utilities because regulators are risk-adverse - the distributed, nature-based solutions cannot guarantee performance the same way established hardware technologies can. Given this risk adversity by regulators, utilities typically do not incur costs passed on to community rate-payers for programs that may not ultimately pass regulatory muster.

Under this methodology, the anticipated carbon revenues therefore provide the additional required facilitation to motivate installation of nature-based solutions, taking both performance and regulatory permit risk, and being rewarded only upon demonstration of implementation success and subsequent avoidance of gray infrastructure needs.

2. Credit Class Overview

2.1. Credit Type

Carbon Emissions Avoided: Avoided future CO_2e emissions calculated by quantifying the multi-year energy and material use from:

1. reducing the use of existing infrastructure,
2. eliminating the need for new infrastructure, and/or
3. eliminating the need for upgrades or retrofits.

For energy this would be the corresponding energy savings multiplied by the average grams or tons CO_2e that exists and is projected to exist in the regional electricity grid for the life of the projected upgrade. For materials this would be the material-specific life cycle inventory data for CO_2e emissions.

2.2. Co-Benefits

By recognizing and promoting the co-benefits of the green infrastructure program, project proponents can increase the program's impact and promote a more holistic approach to sustainable development. The co-benefits can be monitored and reported alongside the avoided emissions of not upgrading water treatment infrastructure to provide a comprehensive picture of the program's impact.

Four co-benefits are included in this credit class. The following are approved co-benefits, but alternative co-benefits can be accepted and appended. Each of these co-benefits is monitored by a specific set of indicators which are defined within the methodology for each co-benefit. The list of co-benefits will be continuously reviewed and updated, in order to account for the most relevant indicators assessing the changes in the ecological state in the project area.

2.2.1. Water Quality Health

This methodology is designed to use green infrastructure to improve water quality in watersheds. Project Proponents may directly measure these water quality benefits and quantify them separately when appropriate.

2.2.2. Ecosystem Health

Improve and/or maintain water quality.

2.2.3. Soil Health and Carbon Sequestration

Green infrastructure practices, such as riparian revegetation and wetland creation, can help to improve soil health by increasing organic matter content, reducing soil erosion, and enhancing nutrient cycling. Healthier soils can lead to increased productivity and resilience of agricultural lands, which can provide additional economic benefits to the local communities.

2.2.4. Community Health

Healthy river systems support a wide range of community health benefits. Disadvantaged communities globally rely more heavily on natural resources to survive, and thus improvements in instream water quality and the species found in riverine ecosystems disproportionately help these communities. Greater amounts of vegetation in riparian zones and in critical watershed areas lead to cleaner air and higher levels of biodiversity. Less toxic algae blooms in rivers are beneficial for all who use the water or recreate nearby, and reductions in nitrate levels in groundwater sources are extremely valuable for the health of communities with shallow groundwater wells. Any reduction in the amount of catastrophic wildfires has huge benefits to air and water quality for communities well beyond the watershed that burns. More resilience agricultural productivity better supports jobs and keeps basic food prices lower. A thriving restoration economy creates many more local jobs than similar amounts of spending on gray infrastructure, and these jobs often don't require advanced degrees and thus are open to a wider range of applicants.

2.2.5. Additional Co-Benefits

Green infrastructure programs can provide a range of additional benefits to the local communities. These may include enhanced biodiversity and increased recreational opportunities. The program can also contribute to the creation of green jobs and the development of local economies.

3. Project Eligibility

This methodology is applicable to green infrastructure projects implemented in any watershed, provided that the project meets the eligibility criteria outlined below. This Credit Class is applicable to new or existing programs, provided additionality is demonstrated, and can be used by project proponents seeking to develop carbon offset projects or to claim emission reduction benefits for their green infrastructure projects. This Credit Class and it's associative Methodology are designed to align with international standards for carbon accounting and verification.

3.1. Project Activity

The project activity approved by this Credit Class is green infrastructure providing water quality benefits. There are many practices that fall under this definition, with examples provided below.

Green infrastructure project activities creditable under this Credit Class will be highly variable in context, design, implementation, and monitoring. The design and implementation process will be iterative, contextual and require qualified expertise.

As such, it is outside of scope of a third party validator to be responsible for approving or monitoring the design of the green infrastructure programs. Instead, the third party validator will verify that the program is additional, is implemented as planned, and that water quality is monitored, consistent with the Credit Verification and Release Schedule detailed in the associated Credit Class document for this methodology.

However, Project Proponents must clearly detail their relevant methodologies, design approaches, standards and approvals in their Project Plan, to provide transparency to all stakeholders.

Project types in the following list are deemed within the scope of applicability for this methodology. Project developers may propose other green infrastructure alternatives for consideration by Regen Network as substantially compliant with the methodology intent.

Watershed Program Project Types

For temperature reduction:

- riparian forest buffer restoration
- flow augmentation
- island augmentation/creation

- water reuse

Nutrient and sediment runoff reductions, agricultural or non-forested lands:

- Structural:
    - riparian forest buffer restoration
    - tree planting
    - livestock exclusion fencing
    - off-stream livestock watering
    - streambank stabilization
    - dredging and aquatic habitat restoration
    - animal waste management system
    - barnyard runoff control
    - sediment basins
    - underground outlet
    - sprinkler irrigation upgrade
    - micro irrigation upgrade
    - surg irrigation
    - tailwater recovery
    - diversions
    - retirement of highly erodible land
    - wetland restoration and natural water courses restoration
    - water reuse
- Practice-based:
    - conservation easements
    - cover cropping
    - crop rotations
    - conservation tillage
    - filter strips
    - rotational grazing
    - straw in furrows
    - nutrient management
    - grass waterways
    - riparian grass buffer/restoration

Runoff reductions and water quality improvements, forested lands:

- riparian forest buffer restoration
- forest road management or decommissioning
- forest harvesting practice improvements
- prescribed fire following native practices
- forest thinning
- reforestation
- Erosion control

Upland non-forestry practices:

- wet meadow restoration
- beaver dam analog development
- beaver introduction
- increasing stream complexity
- opening historic side-channels

A range of example 'best practice' quantification methodologies, protocols, policies and project quality standards are presented as a courtesy below:

- Nutrient Tracking Tool: The Nutrient Tracking Tool (NTT) is a free, online, user-friendly decision-making tool that quantitatively estimates the nitrogen, phosphorus and sediment losses from crop, pasture, forest lands. NTT has been developed by the modeling team at Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University in cooperation with USDA's Office of Environmental Markets, NRCS, and ARS for the last nine years.
- APEX: APEX has components for routing water, sediment, nutrients, and pesticides across complex landscapes and channel systems to the watershed outlet as well as groundwater and reservoir components. A watershed can be subdivided as much as necessary to assure that each subarea is relatively homogeneous in terms of soil, land use, management, and weather. APEX was constructed to evaluate various land management strategies considering sustainability, erosion (wind, sheet, and channel), economics, water supply and quality, soil quality, plant competition, weather, and pests. The routing of water, sediment, nutrient, and pesticide capabilities are some of the most comprehensive available in current landscape-scale models and can be simulated between subareas and channel systems within the model.
- Shade-A-Lator: The Shade-a-lator model contained in HeatSource Version 8.0.8 (Shade-a-lator) is an approved metric for calculating Water Quality Temperature Credits in the Willamette Partnership's Ecosystem Credit Accounting System. Shade-a-lator was developed by Oregon's Department of Environmental Quality (DEQ) to calculate thermal load reductions (or shade potential), in kcal/day, from riparian shade restoration projects. The assessment's spatial unit is a stream reach whose upstream-downstream boundaries are defined by the user, and whose lateral boundaries extend outward and perpendicular to the stream to a distance also defined by the user, but typically not more than 150 feet (the usual size of recommended buffers).
- COMET-Farm: COMET-Farm is a whole farm and ranch carbon and greenhouse gas accounting system. The tool guides users through farm and ranch management practice descriptions, including alternative future management scenarios. Once complete, a report is generated comparing the carbon changes and greenhouse gas emissions between current management practices and future scenarios.
- Soil and Water Assessment Tool (SWAT): The Soil & Water Assessment Tool is a small watershed to river basin-scale model used to simulate the quality and quantity of surface and ground water and predict the environmental impact of land use, land management practices, and climate change. SWAT is widely used in assessing soil erosion prevention and control, non-point source pollution control and regional management in watersheds.

- Willamette Partnership's 'General Crediting Protocol', including Addendum 1 'Minimum Quality Standards for Riparian Planting':
- Willamette Partnership's Protocol for Quantifying the Thermal Benefits of Riparian Shade:
- Watercourse Engineering's Water Temperature Transaction Tool (W3T) monitoring protocol
- USDA's Nutrient Tracking Tool users manual
- US Government policies in support of water quality credit trading
- Great Lakes Commission's Framework for Water Quality Trading in the Western Lake Erie Basin
- Electric Power Research Institute's Pilot Trading Plan 1.0 for the Ohio River Basin Interstate Water Quality Trading Project
- Pennsylvania Department of Environmental Protection's Phase 3 Watershed Improvement Plan Nutrient Trading Supplement
- Maryland Department of Agriculture's Maryland Policy For Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed
- Virginia Department of Environmental Quality's Trading Nutrient Reductions from Nonpoint Source Best Management Practices in the Chesapeake Bay Watershed: Guidance for Agricultural Landowners and Your Potential Trading Partners
- Wisconsin Department of Natural Resources' Guidance for Implementing Water Quality Trading in WPDES Permits:
- American Society of Agricultural and Biological Engineers' Guidelines for Calibrating, Validating, and Evaluating Hydraulic and Water Quality Models

3.2. Project Boundaries

By establishing a clear project boundary, project proponents can ensure that the program's impact is accurately monitored and verified.

3.2.1. Geographic Applicability

The project boundary should be defined based on the geographic scope of the green infrastructure program. This may include the entire watershed or specific sub-watersheds, depending on the program's objectives and resources. The project boundary will also include the water entity which may or may not be within a continuous boundary of the green infrastructure program. This Credit Class is applicable anywhere in the world where green infrastructure could be incentivized and demonstrated to replace gray infrastructure for water quality goals.

3.2.2. Land Use

The project boundary should also consider the land use within the defined area. The program should prioritize green infrastructure projects in areas where they will have

the most impact, such as areas with high erosion rates, degraded riparian areas, or areas with high nutrient loads.

3.2.3. Land Ownership

The program should also consider land ownership within the project boundary. Green infrastructure projects may be implemented on private or public land, and the program must establish clear guidelines for engaging with landowners and securing their participation in the program.

This Credit Class accepts projects which can properly demonstrate land ownership or landowner approval with adequate documentation.

Project Proponent shall own, have control over, or document control over, or have a license to claim the credits from GHG sources/sinks from which removals originate.

Project Proponent shall provide documentation and/or attestation of land tenure. In the case of leased/rented land, the landowner shall agree to all contractual obligations taken by the Project Proponent, and the Project proponent shall provide documentation and/or attestation of title agreement to credits.

3.2.4. Exclusions

The program may also establish exclusions within the project boundary where green infrastructure projects will not be implemented, such as areas that are unsuitable for certain practices, areas with critical infrastructure or areas where other land use practices are prioritized.

3.3. Adoption Date

Adoption Date: Projects run under this Credit Class will accept an adoption date that goes back up to 10 years prior to Project Registration Date. In order to claim an Adoption Date before the Project Registration Date, the Project Proponent must have maintained clear historical records to that effect, as specified in the Approved Methodology.

3.4. Crediting Term

The crediting term is established based on the expected life of the avoided water treatment system. Credits are anticipated to be issued once green infrastructure alternatives are verified, which is likely within the early years of a crediting term.

3.5. Regulatory Compliance

The Project Proponent will certify that Project Activities were conducted in compliance with applicable laws, regulations, permits, and other legally binding requirements, including mandatory provisions of the approved methodology.

4. Project Rules & Regulations

4.1. Approved Methodology

The approved methodologies for this Credit Class are:

1. Watershed Nature-Based and Green Infrastructure Activities Avoiding Emissions from Water Management Gray Infrastructure Construction and Operations Methodology v1.0

4.2. Project Plan

Any project run using this Credit Class must have an aligned project plan.

The Project Plan will define and evidence Project Area(s) Project Activity, Project Eligibility and Project Rules and Regulations. The Project Proponent shall fill out the Project Plan Template and submit for review by the Regen Registry.

4.3. Aggregate Projects

Aggregate Projects are permitted in this credit class. Aggregate projects can be defined as separate utility upgrades and/or utility entities discharging into the same watershed and stream/river.

In the United States, this is defined as utility projects and/or separate utility entities within the same EPA HUC 12 watershed.

An aggregate project may combine several avoided utility upgrades at one or more utilities within a watershed, and may further combine alternative green infrastructure programs to meet water quality goals, provided that the aggregate green infrastructure programs meet, in combination, the summation of all aggregate gray infrastructure baseline alternatives.

The Project Proponent must separately provide LCA analysis for each avoided gray infrastructure alternative, and must monitor the green infrastructure for performance consistent with aggregate water quality goals.

Should the green infrastructure program not fully meet the aggregate combined gray infrastructure alternatives, credit issuances must be pro-rated by the modeled and/or measured shortfall in water quality goals.

4.4. Project Renewal

Any Project Proponent and/or client water utility may renew the program at the end of the crediting period, provided the water quality goals remains in place, and the green infrastructure program meeting the water quality goals remain viable or renewable in lieu of new gray infrastructure construction.

However, any Project Proponent and/or client water utility may not renew and/or submit a new project for registration covering the same water quality goal or obligation during the initial, first registered crediting period. This prevents a scenario wherein a green infrastructure program has failed, resulting in a new or renewed gray infrastructure potential construction that could be double-counted for crediting.

5. GHG Removal & Emission Reduction Requirements

5.1. Additionality

Green infrastructure programs designed to meet water quality obligations or goals, and thereby offsetting emissions associated with gray infrastructure, have variable and evolving effectiveness, costs, risks, and uncertainties. Further, the carbon credit revenue anticipated under this methodology is in most or all cases anticipated to be only a fractional contribution toward the project cost.

While green infrastructure is often more affordable than gray infrastructure, it is not in fact the preferred solution by most utilities because regulators are risk-adverse - the distributed, nature-based solutions cannot guarantee performance the same way established hardware technologies can. Given this risk adversity by regulators, utilities typically do not incur costs passed on to community rate-payers for programs that may not ultimately pass regulatory muster.

Under this methodology, the anticipated carbon revenues therefore provide the additional required facilitation to motivate installation of nature-based solutions, taking both performance and regulatory permit risk, and being rewarded only upon demonstration of implementation success and subsequent avoidance of gray infrastructure needs.

Therefore, under this methodology additionality is sufficiently established when the water entity attests in writing that the anticipated carbon revenue enables green infrastructure water quality solutions that:

a) enable pre-permit action, and/or
b) provides a necessary performance risk-reduction incentive, and/or
c) generate additional demonstrated benefits to existing programs.

5.2. Leakage

Leakage is not required to be accounted for in this credit class as improving water quality with green infrastructure would not plausible cause a water utility to increase additional emissions elsewhere.

5.3. Permanence Period

The credits issued under this Credit Class are permanent during and beyond the credit period.

5.4. Permanence Approach

Credits are permanent when issued, based on the verification that the green infrastructure program is viable, and on track to meeting water quality goals.

5.5. Buffer Pool

A buffer pool is not required for this credit class as all credits are issued only upon ex-post requirements being met.

5.6. Verification

5.6.1. Verifier Requirements

Qualifications of an LCA practitioner include:

Education: A bachelor's or master's degree in environmental science, sustainability, industrial ecology, engineering, or a related field is typically required. The preference is a professional with a Ph.D. in a relevant discipline.

Knowledge of LCA methodologies: Strong understanding of Life Cycle Assessment principles, methodologies, and standards such as ISO 14040 and ISO 14044. Proficiency in using LCA software tools for data collection, inventory analysis, and impact assessment.

Environmental expertise: Comprehensive knowledge of environmental science, including principles of ecology, pollution prevention, climate change, resource management, and waste management.

Technical skills: Familiarity with relevant software tools for LCA, such as OpenLCA, or similar platforms. Competence in using spreadsheets, databases, and other data management tools.

Experience: Experience performing LCA in the areas of biobased systems and traditional infrastructure. This includes experience in all aspects of a life cycle assessment including development of engineering process models, model validation, life cycle inventory data gathering, impact assessment and interpretation of results.

The LCA practitioner must be an expert in the area of life cycle assessment with relevant recent experience.

5.6.2. Verifier Responsibilities

A third party reviewer will verify:

1. Additionality as demonstrated through project utility/entity attestation.

2. The methods and results applied to calculate the avoided GHG calculations described in the Methodology.
3. The implementation of the as-designed green infrastructure project.
4. Water quality monitoring as described in the Project Plan.
5. The Verifier may also need to conduct site visits to the water utility and the site of the green infrastructure installations to verify that the planned upgrade has not taken place and that the green infrastructure project is still in place and functioning as intended.

6. Credit Verification & Release Schedule

The primary credit-generating activity under this methodology is the selection of green infrastructure by a water utility which then avoids decades of GHG emissions related to the facility upgrade which has been rendered unnecessary by the implementation of a green infrastructure solution. The credits generated after this decision are arguably therefore 'ex post' at this stage, given that the credit-generating decision has been made and attested to. However a more conservative approach to credit issuance is taken here that requires monitoring and verification that the green infrastructure has been implemented and water quality benefits are on an anticipated trajectory.

In this Credit Class, 100% of the calculated carbon credits may be issued as ex-post credits once all of the following conditions are demonstrated and verified:

1. Additionality has been demonstrated through water entity attestation.
2. The green infrastructure project has been implemented and monitored for no less than 12 months.
3. The green infrastructure project is on track to meeting water quality performance standards as anticipated by the issuance date as described in the Project Plan. Note: Full compliance with water quality goals may not be achieved, instead the Project Plan should provide a model of anticipated water quality benefits as of the anticipated issuance date, and verify that at least these performance expectations have been met, consistent with the water quality monitoring elements of the associated Methodology.