Guiding Principles For A Practical and Sustainable Approach To Forest Carbon Sequestration Projects In The Southern United States

Developed by the Services, Utilization and Marketing Task Force
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Acronyms

ATFS	American Tree Farm System
BAU	Business as Usual
CCX	Chicago Climate Exchange
FSC	Forest Stewardship Council
GHG	Greenhouse Gas
HWP	Harvested Wood Products
RGGI	Regional Greenhouse Gas Initiative
SFI	Sustainable Forestry Initiative
SGSF	Southern Group of State Foresters

Executive Summary

Introduction

This paper examines the key issues surrounding the development and application of forest-based offset projects in the southern region of the United States and provides the Southern Group of State Foresters' (SGSF) recommendations for how these issues should be addressed in federal climate policy, should legislation be enacted.

SGSF is committed to participating in any process for formulating national rules for developing, measuring and reporting forest-based offset projects. The policy issues involved will be complex and will certainly be debated among stakeholders as policy is developed. These key policy issues are identified in this paper.

Approach

The SGSF Services, Utilization and Marketing Task Force convened the Forest Carbon Work Group in order to identify the key policy issues for forestry offsets in the U.S. Each key issue is explained and alternative approaches are discussed. Recommendations are provided for addressing each issue, along with a rationale. The policy recommendations represent the consensus of the work group.

Key Recommendations

***Eligible Activities*:** Eligible activities should include, at a minimum, the following: afforestation/reforestation, forest management, avoided forest conversion, urban forestry and harvested wood products.

Eligible Carbon Pools: At a minimum, aboveground live biomass, belowground live biomass and harvested wood products should be included in any forest-based offset project.

Measurement and Monitoring: Reference tables and growth/yield models should be utilized as options for calculating carbon stocks in afforestation/reforestation projects, as long as direct measurements are used to "true up" estimates. Harvested wood products should use national estimates. Statistically-designed, re-measurable forest inventories should be conducted periodically for forest management projects. Offset rules should employ a sliding scale in lieu of a required level of statistical precision, with discounts applied to credible carbon based on the lower bound of measurement error.

Verification: Verification should be conducted by an independent, third party organization. State and/or federal agencies should play a role in providing oversight to improve market transparency. A national GIS database should be developed to track offset projects, preventing double counting. Verification methods and results should be made public to provide even greater market transparency.

Baselines and Additionality: The base-year approach to baseline establishment should be employed for forest-based projects in the southern United States. Carbon sequestration achieved above the base year should be considered additional and credible.

Leakage: Internal sources of leakage should be addressed through entity-wide carbon stock reporting. Pending further data, external sources of leakage should be ignored as having a significant impact on the efficacy of a forest project.

Permanence: Forestry projects should employ one of several methods available to mitigate the risk of decreases in carbon stocks that may result from a natural disturbance. Short-term, renewable contracts should be employed to ensure that credible carbon is maintained.

Forest Sustainability: Forest projects should demonstrate a commitment to sustainable forest management by obtaining a state Forest Stewardship Plan. If appropriate, SFI, ATFS or FSC forest certification should be utilized.

Contracts: Contracts should specify project length, monitoring requirements, verification requirements, carbon maintenance/replacement requirements and should have dispute resolution mechanisms in place.

In addition, four general forest carbon policy recommendations are provided:

Protocol development authority: The USDA Forest Service under the direction of the Office of Ecosystem Services and Markets National should develop protocols for forest-offset projects.

Non-offset incentives: Programs that do not rely on offsets should be developed and implemented that reward landowners for maintaining and enhancing forest carbon stocks on private land.

"Stacking" environmental attributes or credits: The sale of carbon offsets should not preclude forest owners from participating in other ecosystem services markets.

Co-benefits of forest offsets: Offsets from forestry activities provide a myriad of co-benefits (clean water, wildlife, aesthetics, recreation, etc.) and should therefore be given priority in climate policy.

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SGSF is committed to participating in any process to formulate national rules for developing, measuring and reporting forest-based offset projects. The policy issues involved in this process will be complex and a source of significant debate.

This paper provides policy recommendations for nine key issues:

1. Eligible activities
2. Carbon pools
3. Measurement and Monitoring
4. Verification
5. Baselines and Additionality
6. Leakage
7. Permanence
8. Forest Sustainability
9. Contracts

In each section, the issue is described and alternative approaches are discussed. SGSF recommendations are presented, along with a rationale.

General Forest Carbon Policy Recommendations

Protocol Development Authority

If a federal climate policy is established in the United States, protocols and procedures for offset programs should not be detailed in legislation. The responsibility for developing protocols and procedures for forest-offset programs should be delegated to the United States Department of Agriculture Forest Service, under the direction of the Office of Ecosystem Services and Markets.

Non-Offset Incentives

Given the appropriate incentives, private forestlands have enormous potential to provide climate benefits through carbon sequestration; however, programs that rely on carbon credit transactions (i.e. offsets) will likely not be sufficient to meet the nation's climate goals. Federal climate policy should support and expand policies and programs that keep forests in forests by slowing conversion to non-forest uses, incentivizing sustainable forest management and expanding the forest resource base. These policies should focus on enhancing the climate benefits of forests by incentivizing activities that will maintain and enhance carbon stocks on privately-held lands, and should adopt protocols and

procedures that are broader and less rigorous than those required by offset markets. Such a program should be practice-based and should be administered in the same fashion as other environmental incentive programs. Contracts should be limited to 10 to 15 years.

"Stacking" Environmental Attributes/Credits

Forest-based activities that are undertaken to offset carbon emissions should be allowed to participate in other environmental market activities (e.g., water, biodiversity). Environmental attributes may be sold individually or bundled and contracts should clearly specify which of these attributes is included in a transaction. Allowing landowners to leverage value from all ecosystem services their forests provide will create higher value and greater incentives to keep forests in forests.

Co-Benefits of Forestry Offsets

Forests provide numerous benefits to society, not just their ability to sequester carbon. These services also include water quality/quantity, flood control, aesthetics, recreation and wildlife habitat. Historically, these societal benefits have been taken for granted, with no dollar value placed on their environmental contributions. Monetizing forest carbon through private forest landowner participation in these markets provides an opportunity for a measure of compensation for the provision of a societal benefit. Since most of the land in the South is in private ownership, landowners that are able to generate additional revenue from carbon markets may be more likely to maintain their forestlands, resisting the pressure to develop their lands. Therefore, forest-based offsets should be given priority over other offset categories.

Eligible Activities

Issue:

In order to have a viable forest carbon offset market, landowners must know which activities will be eligible to participate. Identifying the primary activities is essential to generating greater landowner participation and ultimately increased environmental benefits.

Alternatives Considered:

Afforestation/Reforestation, Forest Management, Urban Forestry, Harvested Wood Products, Avoided Forest Conversion, Biomass, Product Substitution, Non-Offset Incentive Program

Recommendation:

Eligible activities should include, at a minimum, the following: Afforestation/Reforestation, Forest Management, Avoided Forest Conversion, Urban Forestry and Harvested Wood Products. In addition, an incentive program to recognize the many environmental benefits that forests provide should be developed.

Rationale/Discussion:

Planting trees on open lands, including urban landscapes, as well as lands that were forested in the past but are not currently forested have been shown to increase carbon stocks in both tree biomass and soils. These methods are widely recognized by many current forest offset standards and protocols. In addition, sustainable forest management can also provide quantifiable increases in carbon stocks. Carbon is also sequestered in harvested wood products (HWP), such as dimensional lumber and as such, should be included when determining eligible activities. Markets should also recognize the climate benefit of activities that prevent forestland conversion. Greater utilization of wood products also has the ability to replace more energy intensive building materials, such as steel, plastic and concrete, leading to less overall greenhouse gas (GHG) emissions. Not all landowners will be eligible to participate in these markets; however, this should not discount the importance of their forestlands in mitigating any potential impacts from increased carbon dioxide emissions. An incentive program to reward landowners for maintaining forestlands and the numerous benefits they provide society, should be developed to ensure these lands remain forested.

Carbon Pools

Issue:

Central to any carbon-marketing scheme is identifying the various carbon pools associated with the forestry-offset project. Dividing the project into various pools is important because of the need to utilize various inventory processes that are pool-specific. Also, this method of carbon accounting facilitates the elimination of *de minimis* pools for certain project types, optional pool reporting and utilizing cost-effective inventory processes that are pool specific.

Alternatives Considered:

Carbon pools generally include aboveground live biomass, belowground live biomass, dead biomass, soils, litter and HWP. Deciding on which carbon pool to account for depends on the nature of the forestry offset project being implemented. As a rule, carbon pools that are expected to significantly change over the life of the project should be quantified and reported. Generally, it is optional to measure/report carbon pools that are not expected to change over the life of the project. For example, a managed forest project may elect not to account for the soil carbon pool since that pool may not be expected to change significantly over the life of the project. This would avoid unnecessary costs associated with inventory, reporting and verification. However, it may become profitable to include optional pools should market prices for carbon significantly increase.

Recommendation:

At a minimum, aboveground live biomass, belowground live biomass and HWP should be included in any forest-based offset project. Afforestation projects should also be credited for soil carbon at the same rate allowed for no-till agriculture. Since soil carbon is generally unchanged in existing managed Southern forests, it should be considered a stable pool and therefore measurement should be optional.

Rationale/Discussion:

For landowners to profitably participate in carbon markets, it will be very important to identify the appropriate carbon pools required by the market and the inventory costs associated with each pool. The upfront inventory costs to enter the market are a major consideration. The recommendations above reflect those pools most easily measured through the use of models and ground-level inventory. They also reflect the carbon pools most likely to be eligible for market participation.

Including HWP is important for a number of reasons. First, the additional financial compensation for carbon storage in wood products may be a major factor in determining if a forest-based offset project is economically viable for a landowner. Second, crediting the HWP pool directly values utilizing wood in many industries over materials like plastic, concrete and steel. This helps give wood a competitive edge over materials that have a heavier carbon footprint and generally are not considered renewable resources.

Measurement and Monitoring

Issue:

The method used to quantify forest carbon offsets is of critical importance in determining the number of credits that should be assigned to a project. Any quantification method employed should balance precision and accuracy with cost effectiveness, so landowner participation is not deterred. Questions regarding the procedures to quantify forest carbon stocks, including statistical design, frequency of inventories, use of growth and yield models and reference tables should be addressed.

Alternatives Considered:

Existing forest carbon markets employ different methods for quantifying forest carbon offset projects. These methods include reference tables, such as the Energy Information Administration's 1605(b) guidelines, direct measurement, and growth and yield models.

Recommendation:

Reference tables and growth/yield models should be utilized as options for calculating carbon stocks in afforestation/reforestation projects, provided that direct measurements are used to true-up standard estimates. Carbon stored in HWP should be determined using national estimates (see U.S. Department of Energy 1605(b)). Statistically-designed forest inventories, administered by qualified foresters, should be conducted for forest management projects at the time of origination and completion. Credit issuance should be discounted on a sliding scale based on the quantifiable, statistical uncertainty obtained from the inventory. Re-measurable plots should be installed when conducting inventories. Approved growth and yield models (scientifically-based, regionally and species acceptable, peer reviewed) should be used to predict annual increases in carbon stocks. These models should provide conservative estimates to prevent huge changes in carbon stocks after "true-up" inventories conducted no longer than every 10 years, as well as after any harvest or major (stand-altering) disturbance.

Rationale/Discussion:

Forest inventories, based on statistically sound designs can be used to accurately measure the amount of carbon stocks in a forest. Measuring all trees on a stand is simply not practical and cost effective, and would severely limit landowner participation. Discounting carbon stocks can address the quantifiable uncertainty in the inventory. Establishing re-measurable plots is necessary in order to ensure repeatable measurements by qualified auditors and to reduce variance between periodic measurements. Using approved growth and yield models can also predict this change with accuracy, as long as conservative results are produced and reasonable true-up intervals are utilized.

Verification

Issue:

Verification is critical to determining the validity of forest-based offset projects. This aspect provides additional protection to the buyer and seller to ensure that any carbon credit transacted follows all rules, protocols and standards. Qualifications of the verifying organization, methods used, and frequency in which verification takes place must be documented to enhance the legitimacy and public acceptance of these projects.

Alternatives Considered:

Current markets differ slightly on how verification should be conducted in terms of methods and frequency. Most markets recognize the importance of independent, third party organizations in providing this service. Methods generally used include field and desk verification at the time of project origination and completion, as well as during specified intervals throughout the project. The Voluntary Carbon Standard requires a separate validation and verification assessment on all offset projects. Validation certifies the eligibility, additionality and methods used, while verification determines the amount of credits that should be issued.

Recommendation:

Verification should be conducted by an independent, third party organization, approved by the market in which credits are registered. State and/or federal agencies should play a role in providing oversight to improve market transparency. A thorough conflict of interest assessment should be performed prior to project verification. Verification should consist of desk and field audits at the time of project origination and completion, with desk audits being conducted during the interim if credits are to be assigned. Credits should not be issued until verification has occurred. A national GIS database should be developed to track forest-based offset projects to prevent project developers from selling the same credits twice. In addition, verification methods and results should be made public to provide even greater market transparency.

Rationale/Discussion:

Approved, independent third party organizations are best suited to provide verification for forest carbon offset projects. Regulatory agencies facing budget shortfalls and limited personnel may not be able to perform this service in a timely manner. The two-step validation/verification process employed by some standards may lead to increased transaction costs, inefficiencies and reduced landowner participation. Thorough conflict of interest assessments are important to prevent fraudulent activity. Desk and field audits are necessary to ensure all registered projects are following the applicable rules and standards. Issuing credits prior to verification may lead to a lack of public acceptance and validity of the market.

Baselines and Additionality

Issue:

In order to generate marketable GHG emissions reductions, a forest-based offset project must sequester carbon that is in addition to what would have occurred in the absence of the project. Establishing additionality is a critical step in determining the validity of a project, since credible carbon (i.e., carbon eligible for offset markets) is utilized to offset emissions generated elsewhere. Determining project additionality is often a difficult and controversial issue, due to the inherent subjectivity of establishing baselines[1].

Alternatives Considered:

Protocols for establishing forest project baselines utilize one of two general approaches. The first baseline approach is referred to as *business-as-usual* (BAU) in which actual increases in forest carbon stocks are compared to a reference case that represents carbon stocks in absence of the project activities. The reference case is projected into the future in order to measure actual forest carbon sequestered over time. The BAU baseline constitutes a performance standard that projects must exceed in order to generate credible carbon. A BAU baseline may be applied to an individual project (i.e., a reference case is formulated for a particular tract of forestland) or at a landscape level, in which project carbon stocks are compared to regional estimates of carbon sequestration for particular ownerships, age classes and species composition.

The second type of baseline is the "base-year" approach, which compares project-specific measurements of carbon stocks from one period to the next. The year in which the initial measurement of carbon is made provides the basis from which future carbon stocks are compared. Increases in carbon storage above the base-year inventory are considered additional and credible carbon sequestration[2].

[1] Refer to: Galik, C. 2008. A critical comparison and virtual "field test" of forest management carbon offset protocols. Nicholas School of the Environment, Duke University.

[2] Refer to Appendix for details on how each program addresses additionality and baselines.

Additionality is often determined independently of baselines. Tests have been utilized to determine the additionality of forest projects. Often, these tests are focused on determining whether the proposed activity would have taken place anyway without revenue from the potential sale of credible carbon.

Recommendation:

The base-year approach, as applied by RGGI, CCX and 1605(b), should be adopted for forest-based offset projects undertaken on private lands. Financial additionality tests will not provide certainty, so should not be applied to private forest lands.

Rationale/Discussion:

The rules for determining baselines and additionality have generated more controversy than any other aspect of forest project accounting. Much of the debate stems from the opinion that GHG emissions can only be offset using carbon that would not have been sequestered in absence of the project. Thus, support exists for the use of a BAU baseline in order to separate the net climate effects of the offset project from the background sequestration that would have taken place in absence of the project.

Unfortunately, BAU baselines, when applied to forest projects on private lands, are confounded by several important ecological, political and socio-economic factors unique to land-use. In order to establish carbon sequestration that "would have happened anyway", a landowner must establish a projection of carbon stocks many years (often decades) into the future; incorporating a myriad of assumptions about future impacts, market demand for forest outputs, forest laws, tax policy and payments for other ecosystem services. Developing a baseline that successfully integrates these factors is a dubious exercise that will result in uncertainty in the baseline.

For example, future changes in forest harvesting laws might mandate the project maintain higher residual carbon stocks than was projected in the baseline. As a result, carbon that was once credible is deemed non-additional and the economic viability of the project is negatively impacted.

In states where forestry laws currently dictate management decisions, a case can be made for BAU baselines; however, changes in future policy are likely. Even if baseline assumptions hold true, verification of the project is questionable because credible carbon is based upon a counterfactual scenario — the baseline represents activities that never took place, and therefore cannot be accurately compared to actual carbon sequestration. It is impossible to separate credible carbon that is the result of management activities from background carbon sequestration that "would have happened anyway".

Non-industrial private forests meet the increasing demands of a growing human population. The future economic, social and ecological demands that will be placed on private forests are uncertain. In the face of changing conditions, landowners may decide to develop the land, shorten rotation lengths, or clear-cut without regenerating a new forest of equal carbon stocks. In most states, all of these actions are legal and may be in the

landowner's best financial interest.

The base-year approach to baseline establishment does not rely upon complex assumptions about landowner intentions, market forces, or policy. Instead, only one assumption is made: all forest carbon stock changes (both increases and decreases) are the result of management actions undertaken by the landowner. Carbon stocks are measured at one point in time, then again at another point in time using the same methodology. Increases in carbon stocks are awarded as credible carbon, while decreases must be compensated for in accordance with contractual obligations.

Leakage

Issue:

Leakage occurs when a carbon sequestration project causes unintended increases or decreases in GHG emissions elsewhere. Leakage may have impacts at a regional, national or international level, making the quantification of this secondary effect difficult or impossible.

Alternatives Considered:

First, an explanation of leakage types:

- ***Internal leakage*** occurs when activities undertaken on a portion of a forest ownership result in changes in GHG emissions on a different portion of the same ownership (e.g., reduce harvesting in one area while increasing harvesting in another area).
- ***External leakage*** occurs when one forest owner's carbon sequestration activities result in changes in other landowner's behavior in a manner that increases GHG emissions.
- ***Market leakage*** is a type of external leakage that occurs when a forest project reduces the availability of a good, thereby transferring market demand to other forests.

- ***Activity-shifting leakage*** occurs when a project does not replace a land-use activity, but merely displaces that activity to another location.
- ***Positive leakage*** occurs when one landowner's activities have a positive impact on carbon sequestration in other forests.

There is general agreement among protocols that internal leakage should be addressed through entity-wide reporting of carbon stocks. When appropriate, forest certification through SFI, Tree Farm, or FSC may provide additional assurance that carbon stocks are managed sustainably.

Not all programs address external leakage in the same fashion[3]. The task of determining the direct impacts of one landowner's decisions on other landowners, or broader market impacts, is exceedingly complex. As a result, some programs choose to ignore external sources of leakage. Those programs that have adopted methodologies for estimating leakage are not consistent with one another, or rely on limited data sets.

Recommendation:

Efforts should be made to control internal leakage through entity-wide reporting and, when applicable, forest certification. Until more data is collected, external leakage should be ignored as a significant detriment to forest projects. If carbon markets require estimates of external leakage, uniform national standard, based upon a consistent body of research, should be utilized.

Rationale/Discussion:

In theory, internal leakage impacts can be mitigated by requiring entity-wide reporting that accounts for all harvests, plantings, mortality and growth in order to estimate net changes in carbon stocks; however, this approach may be difficult to implement practically. Landowners may own forestland in multiple counties or states, under a variety of legal classifications. Ensuring that all forestland is accounted for may provide some logistical challenges. A clearly-defined attestation by the landowner may be adequate to remedy this issue.

Accounting for leakage provides significant challenges for landowners. External leakage impacts may be difficult or impossible to accurately quantify. Although there is general consensus that external leakage is a real issue that may impact the efficacy of forest offset projects, there is little data available to accurately estimate these secondary effects of the project. Provided that further data is made available, national estimates of leakage may provide a solution to this problem.

Although most debate surrounds the negative impacts of leakage, regulations should also recognize the potential for positive leakage to mitigate negative impacts.

[3] Refer to the Appendix for details on how different programs address external leakage.

Permanence

Issue:

Permanence addresses the degree to which sequestered carbon is permanently removed from the atmosphere. Considerations of permanence, like additionality, are central to the carbon offset debate as it relates to forestry offset projects. Two elements need to be addressed: long-term atmospheric carbon removals and accumulated carbon storage reversals that can be caused by natural disasters such as wildfire, hurricanes, or insect and disease. Some insurance or risk-pooling mechanism needs to be in place to offset these losses should they occur.

Alternatives Considered:

Debated positions range from permanence being achieved in perpetuity through a conservation easement, short-term contracts measured in only a few years, or some type of deed restriction. There are several alternatives put forth by various registries, exchanges and carbon market standards to address permanence. The Chicago Climate Exchange (CCX) addresses permanence by requiring landowners to maintain their forestry offset project for a period of 15 years. Only afforestation projects that have been placed under a permanent conservation easement are allowed by the Regional Greenhouse Gas Initiative (RGGI). Another approach recently put forth to address permanency and enhance smaller landowner participation in carbon markets is carbon banking[4]. To guard against the risk of reversals, the following methods may be used:

- ***Buffer pools*** — projects hedge against risk by placing a percentage of issued credits into a savings account.
- ***Insurance*** — indemnification against loses, where the insurer promises to issue payment to the landowner in order to compensate the credit purchaser.

[4] For a detailed discussion of carbon banking, see: Bigsby, H., 2009. Carbon banking: Creating flexibility for forest owners. Forest Ecology and Management 257, 378-383.

- ***Like-kind pools*** — forestland managed for carbon sequestration that serves as a replacement reserve for projects that generate and sell carbon credits.
- ***Biological risk management*** — forest management activities that reduce the risk of wildfire, pests and disease.

Recommendation:

To enhance the opportunity for non-industrial private forestland owners in the South to participate in carbon markets, it is recommended that term contracts be utilized. Contract lengths of 10 to 20 years may be acceptable to many landowners, especially when forest rotation lengths may span 25 to 80 years depending on the species and product being managed. Provisions for offset "rentals" should be included in regulations. Emitters who purchase rented offsets remain liable for offsets claimed and must renew or replace credits at the end of the contract. Market mechanisms will determine the value of rented carbon relative to permanent offsets and allowances. This will provide broader participation while ensuring that the integrity of the environmental benefit is maintained.

To ensure that project offset permanence is met there will need to be some mechanism to insure against reversals. Regulations should require that some provision be made to address non-permanence and natural disturbance in order to ensure the integrity of the offset. The manner in which reversal risk is addressed should be left to the determination of the market. All of the risk management strategies discussed above will have a place in a regulatory market.

Rationale/Discussion:

To encourage the typical Southern forest landowner's participation in any carbon market, be it a compliance market or a voluntary market, protocols that address permanence with short-term contracts is critical. Requiring long-term contracts or conservation easements will deter many landowners from entering the market.

All forest projects should include reversal mitigation strategies in order to ensure project integrity, public acceptance and credibility in the market.

Forest Sustainability

Issue:

Forest projects are often required to provide evidence of sustainable forest management. Commonly, demonstrating sustainability is achieved through third party certification programs (i.e. SFI, ATFS, FSC). Third-party certification provides independent evaluation and monitoring of the project that can be leveraged to demonstrate sustainable project management and enhance transparency.

Alternatives Considered:

Protocols typically require that forest projects that include timber production obtain third party sustainability certification. For forest projects that do not include timber production, specific recommendations are provided; however, it is implied that management plans should be developed.

Recommendation:

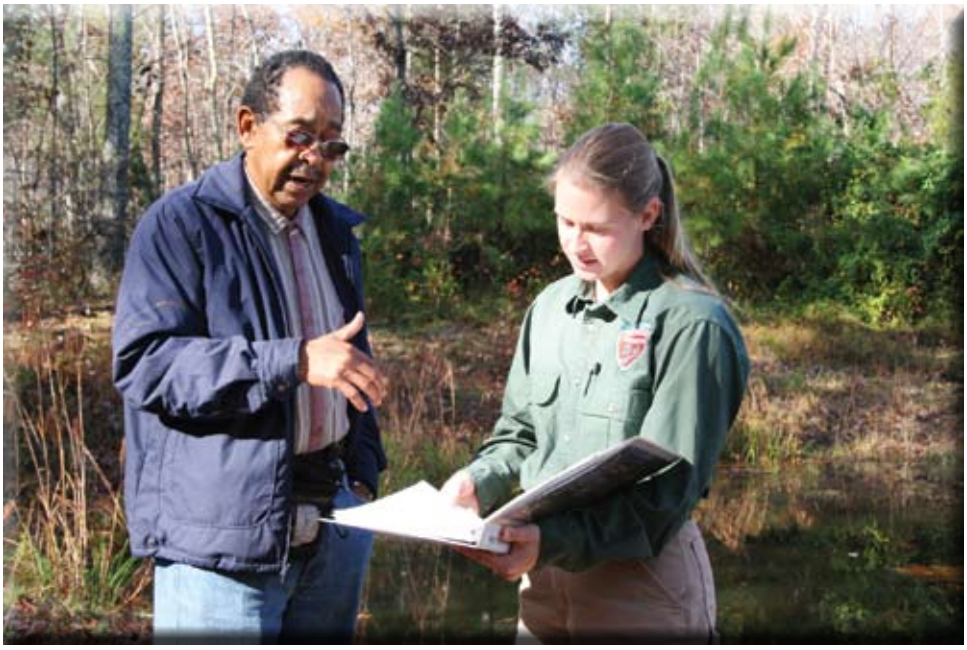
All projects developed in the U.S. should be required to have a state Forest Stewardship Plan.

If applicable, projects should attain forest sustainability certification.

Rationale/Discussion:

Forest certification is an appropriate measure for forest-based offset projects that are managed for forest products as well as carbon sequestration. Obtaining certification can provide broad assurances to the market that the forest project is managed sustainably and effectively mitigate the risks of internal leakage. However, not all certification programs will be equally-applicable to all projects. The choice of which certification to obtain should be left to the discretion of project landowners.

State Forest Stewardship programs provide an opportunity for project landowners to develop high-quality management plans in coordination with state forestry agencies. Stewardship programs provide an existing platform that could be leveraged for forestry offsets to ensure sustainability and to enhance transparency.



Contracts

Issue:

Contracts are another critical component of an effective carbon offset market. Just like verification, this aspect provides additional protection to both the buyer and seller. Specifically, these legally binding documents clearly define the delivery of carbon credits. Important considerations include contract duration, credit issuance, requirements for strict adherence to protocol rules and penalties for contract violations.

Alternatives Considered:

Virtually all existing carbon markets require some form of formal contract before entering into transactions. As with any other asset sale, verbal agreements are not recommended. Existing markets vary in how they define contract length (15, 20, 100 years), issue credits (annually, specific intervals), monitor projects and penalties for violations.

Recommendation:

Contracts should be written emphasizing that all applicable protocol rules should be followed for a specified length of time. Short term or annual "rental payment" type contracts are preferred, but should not be the singular option. Penalties should be significant and explicitly stated for landowners that violate the terms of the contract or falsify information on their application. Contracts should specify project length, monitoring requirements, verification requirements, carbon maintenance/replacement requirements, and should have dispute resolution mechanisms in place.

Rationale/Discussion:

As a legally binding agreement, the contract aids transparency, lowers market risk, and by extension, encourages confidence and trust by the participants. This ensures that ownership, tenure and use rights are legally documented and undisputed and clear ownership of carbon credits is generated.

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Appendix:
A Comparison of Selected Programs, Policy and Protocols

ELIGIBLE FOREST ACTIVITIES

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Eligible activities	Afforestation	Afforestation, reforestation and re-vegetation	Reforestation	No specific project types, but includes examples of afforestation, forest management, forest conservation	Afforestation
	Forest management	Agricultural land management	Improved forest management		
	Urban forestry	Improved forest management	Avoided conversion		
		Reduced emissions from deforestation and degradation (REDD)	Urban forestry		

Program/ Element or Issue	Maine Forest Service RGGI Recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Eligible activities	Urban forestry	Urban forestry	Afforestation/reforestation	Afforestation/reforestation	
	Forest management	Afforestation		Urban forestry	
		Reforestation		Forest management with harvested wood products	
		Forest management		Avoided conversion	
		Forest conservation		Avoided emissions from natural disturbance	
		Forest products		Substitution of wood for fossil fuel intensive goods	
				Complementary program for increasing carbon storage that does not rely on “crediting”	
				Improved recovery from manufacturing sites	

ELIGIBLE FOREST CARBON POOLS

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Carbon pools	Afforestation includes live tree and soil organic carbon. Forest management includes above- and below-ground biomass, including stem, branches, bark and coarse wood roots and wood products.	Afforestation, reforestation and re-vegetation: above-ground biomass, below-ground biomass, dead wood, litter, soil organic carbon, wood products. Improved forest management: all pools that will decrease above a *de minimus* of 5% of total increase should be measured. Soil carbon and below ground are considered *de minimus*. Dead biomass is optional.	(i) above ground living biomass (ii) below ground living biomass (iii) dead biomass (iv) soil (v) wood products All are provisionally required unless justified to be excluded.	Provides methodology for measuring every major pool, but does not mandate which pools must be reported. The book suggests that a comprehensive approach to measurement is desirable.	Live above-ground biomass; live below-ground tree biomass; soil carbon; dead and down, optional if baseline measurement for this pool is near zero.

Program/ Element or Issue	Maine Forest Service RGGI Recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Carbon pools	Not specified	All pools that are thought to be significantly affected should be included. If pools can be shown to have negligible impact or will remain constant, they may be excluded.	Live trees and snags, below-ground biomass, understory vegetation, down dead wood, duff and soil.	All carbon storage pools that are thought to be significantly affected should be measured; no specifics provided for determination.	

MEASUREMENT AND MONITORING

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Baseline establishment and periodic measurement characteristics	Combination of growth/yield models and direct measurements to establish base year. Net carbon changes are measured using growth/yield models and direct measurement.	Direct measurement with growth/yield models	Direct measurement and growth/yield models to establish BAU; direct measurement periodically	Methodological recommendations provided. Standard forestry sampling techniques designed to ensure precision and accuracy for all carbon pools.	Direct measurements following guidelines to establish base year
Measurement interval	Stock changes estimated on annual basis	Maximum of five years	Annual reporting using growth/ yield models and inventories. Direct measurement data may be no older than 12 years. Inventory confidence must be reported on annual basis so annual discounts can be applied.	10 years between plot sampling	Carbon must be calculated no less than every five years; Unclear if direct measurement is required to calculate carbon stocks
Approved carbon estimation methods	Direct measurement, growth/yield models appropriate for site and species, afforestation tables	Approved on case by case basis, only currently accepted methodologies are CCAR and Clean Development Mechanism	Must conform to CCAR protocol	Methodology provided (standard sampling techniques)	Only direct measurement; no language providing for growth/yield models
Approved forest inventory methodologies	Case by case basis, based upon sound forest measurement principles and result in desired accuracy	Case by case basis	Site and species appropriate, peer reviewed	N/A	Sampling must be consistent with 1605(b) Part 1 appendix: forestry section 3: measurement protocols for forest carbon sequestration.
Discounting for uncertainty	Yes, twice the reported statistical error	Yes	Yes	Not specified	

MEASUREMENT AND MONITORING

Program/ Element or Issue	Maine Forest Service RGGI recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Baseline establishment and periodic measurement characteristics	Base year approach with FIA carbon stocks performance standard	Follow 1605(b) guidelines	Scientifically-appropriate methodologies, recommends sampling methodology that follows general 1605(b) guidelines. Recommends FORECARB2 carbon tool and RAPCOE model.	100-year BAU baseline based upon best science available and including all pools	
Measurement interval	Per RGGI rules	Direct measurement should be used at end of reporting contract period to true up estimates based upon growth/ yield models	Not specified	Not specified	
Approved carbon estimation methods	Not specified		Growth and yield with quantifiable uncertainty (direct measurements needed to validate growth/yield models periodically, or direct measurements.	Not specified	
Approved forest inventory methodologies	Not specified	1605(b) guidelines for a nationally consistent approach	Not specified	Not specified	
Discounting for uncertainty	Not specified	No specifics, but supports discounting	Not specified, but implied that discounting will be applied	Not specified	

REPORTING PERIOD

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Reporting period	Reporting through compliance period (phase ii ends 2010)	Minimum of 20 years, maximum of 100 years	Six-year reporting cycle; protocol indicates that you must report annually for 100 years, or offsets are cancelled	Reporting should, in theory, be indefinite; no schedule for reporting activities is provided	20 Year minimum reporting period.

Program/ Element or Issue	Maine Forest Service RGGI Recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Reporting period	Assume RGGI rules apply	Short term reporting obligations are preferable; 10 to 15 years	Not specified	No specific schedule, but likely to mirror CCAR	

ADDITIONALITY

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Performance standard or project-specific additionality	No formal definition of additionality; determinations are based upon eligibility criteria as outlined in the CCX rulebook	May be either performance based or project specific; all the approved methodologies are currently project specific	Project-specific performance standard	Performance standard	Project specific
How is additionality determined?	Additionality testing is not distinct step. Based upon project performance. All growth above baseline, as established through rulebook, is considered creditable	Project-based additionality test: Step 1: regulatory surplus Step 2: implementation barriers Step 3: common practice. Other tests available, but not as applicable to forestry	Annual carbon stocks minus 100 year baseline that incorporates legal, financial requirements and management history	Uses method called proportional additionality that assumes that, in absence of project, the project land would be managed similarly to other comparable lands in the region. E.G., If baseline is 1 ton/ acre/year, then only that growth rate that exceeds 1 ton/acre/year is additional.	Base year approach. Changes in carbon stocks are calculated using stock change approach. Delta between baseline and reported growth is additional. Net carbon = subsequent inventory minus first inventory.

ADDITIONALITY

Program / Element or Issue	Maine Forest Service RGGI recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Performance standard or project-specific additionality	Performance standard	Project specific	Performance standard	Project-specific performance standard	
How is additionality determined?	Base year approach. Project C stocks compared to FIA mean stocking to determine level additionality. Below FIA mean: (i) 50% credit for new carbon up to FIA mean (ii) 100% credit for additional carbon above FIA mean Above FIA mean: (i) 75% for delta (ii) 100% for new growth.	Base year approach as defined in CCX and RGGI. Stocks are measured subsequent to base year. Increases are considered additional.	Follows assumptions given in RAPCOE model. Additionality is determined by the likelihood of land use conversion for cropland or pasture. Determine likelihood that cropland will be converted to another land use and the likelihood that it will be converted to forest use based upon national data sets. For southeast, afforestation is generally additional (99%).	Above BAU moving baseline	

BASELINES

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Baseline establishment	Base year target 90% confidence +/- 10% error of mean for baseline carbon; Discounts applied	Without project (BAU) is projected using three criteria: (i) environmental practices equal commonly considered minimum standard (ii) minimum legal requirements for forest management (ii) documented history of forest	100-year model of carbon stocks that reflects legal requirements, physical limitations and financial limitations, pursuant to current conditions; financial analysis of BAU conditions; history of management and biological stocks must be incorporated into BAU.	Carbon stock changes on comparable lands used to establish baseline. This is a "moving" baseline from which project can be compared.	Base year approach, measurement must result in 95% confidence +/- 10% error of mean carbon stocks

Program/ Element or Issue	Maine Forest Service RGGI Recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Baseline establishment	Project established using base year approach	Base year using direct measurement	Proportional additionality, calculate likelihood of land use conversion. Based upon prevailing trends in land use change in the region. Steps: (i) determine probability of land use transition for each possible scenario (Ii) estimate carbon consequences of each scenario (Iii) estimate total project baseline by summing across products of each transition and associated carbon stock changes	Stocks above 100 year BAU are additional. Reservations about this method are voiced, but conclusion is that this best fits in with other offset categories.	

PERMANENCE

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Maintenance of carbon stocks	Project owner agrees to maintain project for the phase, as well as 15-year non-binding letter of intent to maintain land in forest	Detailed risk assessment for each project approved by a verifier. A second verifier must agree on the risk assessment. Higher risk for reversals means more credits deposited into the buffer reserve. Reserve may be drawn down over time if reversibility is less than predicted.	100-year contractual obligation to maintain forest carbon stocks	Not specifically addressed. With complete accounting, it is assumed that losses will be documented; however, no method for addressing the reversals is provided.	Permanent conservation easement that: (i) maintains land in forested condition into perpetuity (ii) maintains carbon density at long term levels at or above those achieved at end of crediting periods (iii) requires land to be managed using environmentally sustainable forest practices. Also, 10 percent discount to account for decreases in carbon, unless insurance is held that guarantees that credits will be replaced.
Reversal mitigation	20% Reserve pool	Buffer pool	Buffer pool	N/A	10% discount on measured changes in carbon stocks or get insurance on offsets issued

PERMANENCE

Program/ Element or Issue	Maine Forest Service RGGI recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Maintenance of carbon stocks	99-year obligation to maintain carbon stocks; encumbrance must be carried on to subsequent owners	Market mechanisms should be implemented to insure the efficacy of offsets: (i) safe harbor provisions (Ii) insurance (Iii) pooling of risk (iv) like-kind pools (v) physical risk management. Short term contracts are preferred (5 to 15 years is specified). Market valuation will determine the value of offsets vis-a-vis permanent reductions.	Recognizes that projects must be reported into perpetuity in order to be permanent but that is not feasible. Steps must be in place to ensure that stocks are not reversed.	100-year contractual obligation with regulatory or contractual mechanisms for guaranteeing against reversals; measures installed for financial assurance of credit integrity, and the state should have regulatory authority to enforce payback provisions	
Reversal mitigation	No specific methods provided	Provisions detailed above	No specific methods provided	Natural reversals should be mitigated through state-held reserve pool or private insurance	

LEAKAGE

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Internal leakage	Sustainability certification for all managed lands under the ownership	Project must demonstrate that internal leakage is not occurring	Monitoring of carbon stocks on non-project lands	Not specifically addressed	Leakage is not specifically addressed in model rule
External leakage	Not addressed	Market leakage is dependent upon the type of improved forest management. Project must take a discount to account for higher leakage risk. Significant decrease in products harvested result in higher risk, for example.	Discounts applied to afforestation based upon regional averages derived by epa. Forest management does not have market leakage if it continues to produce wood products at relatively same rate (less than 25% decrease in harvest rate).	Market leakage is primary focus; supply elasticity is used to estimate	Leakage is not specifically addressed in model rule

Program/ Element or Issue	Maine Forest Service RGGI recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Internal leakage	Entity wide reporting is assumed	Forest wide reporting should be used	Entity wide reporting implicit		
External leakage	Forest management projects must be managed for forest products (market leakage)	External leakage should be ignored	Activity shifting leakage and market leakage are accounted for using RAPCOE model	External leakage can be ignored because: (i) assume that timber harvest is part of project (ii) wood products market is flexible enough to absorb incremental effects on carbon projects (iii) indirect market effects that increase or reduce demand for forest products elsewhere, if they do occur, may not have significant net carbon storage effects, when considering the multiple influences on forest management sustainability and in forest carbon storage	

VERIFICATION

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
General requirements	Verification follows schedule of field and desk audits based upon size of project pool; schedule of field verification and desk audits; proportion of pool that is subject to verification on an annual basis is based upon pool size. Verification elements include: ownership, forest existence, certification, contract, acreage, species mix, carbon methodology.	New methodologies, risk assessment and market leakage assessment are subject to double verification: Step 1: submit project description, monitoring plan, proof of title and validation report to the accredited validation/verification body Step 2: validation report for additionality Step 3: verification report that provides ex post calculations of GHG reductions and emissions.	Verification is required for both forest entity offset projects as well as forest entity emissions. Stated goals of certification: (i) proper identification of required carbon pools (Ii) proper implementation of management and inventory methodologies (Iii) carbon calculations carried out accurately (iv) "certify" any emissions reductions that have occurred	Provides guidance on the role of a verifier and provides recommendations for developing monitoring plans; no specific requirements are provided	Monitoring reports (carbon calculations) must be submitted at least every five years; verification reports must be submitted with each monitoring report

VERIFICATION

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Frequency of activities	After project approval, each year and at end of the project; field verification takes place at approval and end of compliance period	Verification must be made every time credits are to be deposited; minimum interval seems to be five years; after five years, a penalty is assigned and 50% of buffer account is canceled	Biological inventory must be "certified" in years one and six of a six-year reporting cycle. In years two through five, certifiers verify the annual monitoring report.	Provides guidance on the role of a verifier and provides recommendations for developing monitoring plans. No requirements are specified.	Project developer must develop a monitoring and verification plan that is certified by the regulatory agency. Monitoring/ verification reports must include: (i) data from direct measure for all plots (ii) direct measurement procedures (iii) designation of sub-populations and determination of minimum number of plots (iv) assessment of management practices if harvesting takes place. Practices must be consistent with SFI, FSC or ATFS, but no certification is required.
Validation	Approval by CCX Forestry Committee	Validation required to evaluate additionality and adherence to VCS guidelines	No validation required, but optional pre-approval process is available	Provides guidance on the role of a verifier and provides recommendations for developing monitoring plans. No specific requirements are provided.	No validation required
Verification	Required	Required	Required; verification referred to as certification in protocols	Provides guidance on the role of a verifier and provides recommendations for developing monitoring plans; no requirements are specified.	Required

VERIFICATION

Program/ Element or Issue	Maine Forest Service RGGI Recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
General requirements	No information provided, assume it adheres to RGGI's model rule	Recognizes that third-party verification will be necessary; suggestions for cost savings, including project owner update reports in between verifications, utilizing Tree Farm to cut verification costs	Verification is recommended, but no specific guidance for forestry projects; verification documentation focuses on emissions verification	Auditing through third party or state regulatory agency. Verification should focus on (i) method of establishing BAU baseline, (ii) methods of designing and estimating the effects of carbon offset projects on all storage pools (iii) actual achievement of additional carbon storage above baseline in all pools. Costs should be kept as low as possible through aggregation of micro projects.	
Frequency of activities	No information provided, assume it adheres to RGGI's model rule	Not specified, but tends to support less frequent and intensive verification activities	Not specified	Not specified	
Validation	No information provided, assume it adheres to RGGI's model rule	Not specified	Not specified	Not specified	
Verification	No information provided, assume it adheres to RGGI's model rule	Supports verification	Not specified	Not specified	

SUSTAINABILITY

Program/ Element or Issue	Chicago Climate Exchange (CCX)	Voluntary Carbon Standard (VCS)	California Climate Action Registry (CCAR)	Willey, Z. Chameides, B., ed. 2008. Harnessing Farms and Forests in the Low-Carbon Economy. Duke University Press.	Regional Greenhouse Gas Initiative (RGGI)
Sustainability	Third-party certification required for managed lands	Recommends that best practices be followed, specifically mentions FSC, but no specific language requiring third party certification.	If harvesting takes place, ATFS, SFI or FSC must be in place	Recommends certification	FSC, SFI or ATFS enrollment required prior to harvest activities

Program/ Element or Issue	Maine Forest Service RGGI Recommendations	Sampson et al. 2007. Making Forest Carbon Credits Feasible: A Policy Paper.	Climate Leaders	Forest Sector Workgroup on Climate Change Mitigation Final Report (Washington State)	
Sustainability	SFI, FSC or ATFS enrollment or verify that harvesting is done at a rate that approximates business as usual harvest rate for appropriate geographical area	No mandated requirements, but concedes that ATFS, SFI, etc. provide value in offset projects	Not specified in afforestation protocol	Not specified	