Selling

FOREST CARBON

A practical guide to developing forest carbon offsets for Northeast forest owners

by Julie Beane, Manomet Center for Conservation Sciences

Revised September 2012

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BACKGROUND & ACKNOWLEDGEMENTS

This document was produced through a joint effort of Manomet Center for Conservation Sciences and the Northern Forest Center. It serves to update a 2009 publication entitled "Payments for Forest Carbon: Opportunities and Challenges for Small Forest Owners," written by Rebecca Brooke. This report builds on the original document by providing updated information about the carbon offset market and refocusing on a broader audience. Where the original document provided a thorough overview of carbon markets and their relevance to small landowners in the Northern Forest, this document is intended as a practical "how-to" for Northeast landowners of all sizes exploring the revenue potential of the carbon marketplace.

This document was authored by Julie Beane, Manomet Center for Conservation Sciences, with assistance from John Gunn, formerly of Manomet Center for Conservation Sciences, currently with the Spatial Informatics Group–Natural Assets Laboratory and Joe Short, the Northern Forest Center. Graphic design provided by Karyn Smart. Thank you to Kelly Short at the Northern Forest Center for reviewing this report. Photos by Jerry Monkman/EcoPhotography.

Funding for this report was provided by the U.S. Endowment for Forestry & Communities and by USDA Rural Development.

Organizations & Contact Information

Manomet Center for Conservation Sciences

As one of the nation's oldest independent environmental research organizations, Manomet www.manomet.org, is working to achieve a more sustainable future. Manomet convenes stakeholders and helps develop science-based, enduring solutions that work in the real world and improve conditions for wildlife, habitats and people.

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Northern Forest Center

The Northern Forest Center is a non-profit founded in 1997 to advance thriving communities and healthy forests across Northern Maine, New Hampshire, Vermont, and New York.

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U.S. Endowment for Forestry and Communities

The U.S. Endowment for Forestry and Communities, Inc., is a not-for-profit corporation established at the request of the governments of the United States and Canada in accordance with the terms of the Softwood Lumber Agreement of 2006 between the two countries. The mission of the Endowment provides that: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.

USDA Rural Development

USDA Rural Development is committed to the future of rural communities. Our role is to increase rural residents' economic opportunities and improve their quality of life. Rural Development forges partnerships with rural communities, funding projects that bring housing, community facilities, utilities and other services. We also provide technical assistance and financial backing for rural businesses and cooperatives to create quality jobs in rural areas. Rural Development promotes the President's National Energy Policy and ultimately the nation's energy security by engaging the entrepreneurial spirit of rural America in the development of renewable energy and energy efficiency improvements. Rural Development works with low-income individuals, State, local and Indian tribal governments, as well as private and nonprofit organizations and user-owned cooperatives.

OVERVIEW

Private forestlands dominate the landscape of the northeastern U.S., providing economic resources, recreational opportunities, open space, clean water, and wildlife habitat. People in the region value these services and yet forests are increasingly threatened by development pressure, invasive species, and the imminent transfer of forestland to a new generation of owners.[1]

Small forest owners (who own 55% of forestland in the Northeast, generally in parcels of less than 1,000 acres) are challenged to maintain forestland in the face of such pressures.[2] Larger, industrial forest owners face their own set of challenges, including short-term revenue demands from shareholders or investors that lead to land sales for maximum short-term economic gain such as development.[3]

Where timber-based income from forestlands is insufficient or a landowner simply wishes to diversify income streams, additional sources of forest revenue, such as carbon offsets, can be an option for landowners to keep forests as forests.

Resources

Landowners and foresters will find many helpful resources online at http://www.northernforest.org/es_resources.html, including links to websites, online tools, services, publications, and standards for forest carbon offset programs.

Please check the online Resources for the latest information.

Forest carbon sequestration projects have the potential to provide a new income stream to forest owners of all sizes. The forest carbon marketplace has been growing steadily every year and continues to mature and gain rigor. Recent trends include:

- Globally, 2010 saw the greatest jump in the number and value of carbon offset transactions to date.
- From 2009 to 2010, average forest carbon offset prices increased 22% bringing the total value of the market to $178 million.[4]
- Over 90% of the volume of the global carbon offset market came from voluntary transactions and 46% of those came from forest carbon projects.[5]
- In North America, the value and volume of the carbon marketplace fell in 2011 but are expected in 2012 to at least double.[6]
- While still ever changing and inherently uncertain, the carbon marketplace is growing and maturing, making it less and less the "wild west" it once was reputed to be.

In New England each year, forests sequester enough carbon to remove from the atmosphere 23 to 43 percent of the region's electricity and heating emissions.[9] Connecting northeastern forest owners to programs and markets that provide payments for carbon sequestration could result in new revenue for landowners and better environmental stewardship of the region's forests. Carbon markets already exist and several northeastern forest projects have been developed[10], but accessing carbon markets can be complex and profitability depends on many factors. This report examines both the opportunities and challenges landowners face in engaging in forest carbon sequestration projects. It describes how forest carbon offset projects are developed and brought to market, and how landowners can evaluate the financial potential of developing a project on their lands.

What is Carbon Sequestration?

Carbon sequestration is a naturally occurring process wherein carbon is captured from the atmosphere and stored in carbon "sinks." The largest carbon sinks are oceans, vegetation, and soils.

How is Carbon Sequestration Beneficial?

Humans can take actions to increase carbon sequestration, beyond that which occurs naturally, to help reduce the amount of carbon dioxide in the atmosphere, the primary contributor to climate change. Climate change is already affecting precipitation and temperature patterns around the world, causing droughts, raising sea levels and increasing the strength and frequency of storms.[7]

How Can Forest Owners Sequester Carbon?

Forests, through the process of photosynthesis, take carbon (in the form of CO_2) out of the atmosphere and sequester it in trees and shrubs and soil. U.S. forests presently sequester 10 percent of all domestic carbon emissions annually, and this amount could be increased by changes in land management practices.[8] Forest carbon sequestration projects, including activities such as reforestation, afforestation, avoided deforestation, and improved forest management, can all help to sequester additional carbon.

THE CARBON MARKETPLACE

Carbon is currently traded in multiple markets around the world, sometimes voluntarily (the "voluntary market") and sometimes to comply with government regulation (the "compliance market"). To date, all carbon offsets created in the U.S. have been sold in voluntary markets.* Voluntary market transactions are trades between a buyer and seller that are not driven by regulation or legally mandated reductions. Voluntary buyers range widely, from individuals driven by personal values, to businesses and other institutions striving to meet internal emission reduction goals or anticipating future regulatory action (the "pre-compliance market"). In 2010, the voluntary marketplace was worth $424 million, with 33% of all transactions originating in the U.S. and 42% of all transactions involving forest projects.[11] Offset projects may be developed to adhere to any number of carbon offset standards, some more rigorous than others, and subsequently the price paid for carbon is determined in part by the standard used.

The information that follows focuses primarily on the voluntary marketplace, as currently that is where the most tangible opportunities for forest landowners lie for selling carbon offsets. However, to have a basic understanding of current and future opportunities, it is important to be aware of two efforts within the compliance market.

The Regional Greenhouse Gas Initiative (RGGI), in operation since 2009, is a cap-and-trade program in which nine northeastern states voluntarily participate. The goal of RGGI is to reduce GHG emissions from power plants in member states by 10% by 2018.[12] Regulated facilities can meet up to 3.3% of their reduction obligation using offsets.[13] RGGI has a protocol for developing offsets from afforestation projects, but to date, no offsets of any type have been purchased under RGGI.[14]

What Is A Carbon Offset?

A carbon offset is a reduction in greenhouse gas emissions, or an increase in carbon sequestration, used to neutralize or cancel out an equivalent amount of emissions. Offsets are a tradable commodity generated by one party and sold to another party looking to offset its emissions. One offset is equal to one metric ton of carbon dioxide equivalent—the amount of carbon dioxide emitted by consuming 112 gallons of gasoline.

* Before 2010, at which time the Chicago Climate Exchange (CCX) ceased to be a voluntary cap-and-trade and offsets program, the voluntary marketplace was separated into two categories: CCX and the OTC markets. Now, the terms "voluntary" and "OTC" can be used interchangeably. CCX still operates an Offsets Registry Program (https://www.theice.com/ccx.jhtml) through which forest landowners can register their carbon offsets using CCX's Forestry Carbon Sequestration Protocol; however, the future of the registry system is uncertain and transaction prices for CCX forestry offsets are currently so low (ranging from $0.60 to $2.00 in 2011) that it does not warrant further discussion in this report.

On January 1, 2012†, a new California cap-and-trade program (known as AB 32) took effect that will create opportunities for forest landowners to sell offsets into the compliance market. The goal of AB 32 is to reduce the state's emissions to 1990 levels by 2020. Regulated facilities will be allowed to cover up to 8% of their compliance obligation with offsets.[15] The program, implemented by the California Air Resources Board (ARB), has released protocols for four types of offset projects, including forestry. The ARB's forest project protocol was built off the Climate Action Reserve's (CAR) Forest Project Protocol and includes an Early Action Offset Program to allow for the transition of eligible offsets already developed.[16]

Forest landowners can use the ARB protocol now to develop offsets from U.S. forest projects as part of the pre-compliance market, in preparation for the January 1, 2013, compliance start date. AB 32 is expected to generate demand for up to 28 million metric tons of offsets in the first compliance period (2013 and 2014) and the supply of forest offsets could reach 10 million metric tons (Rajinder Sahota, personal communication, March 14, 2012). Until ARB releases additional protocols expanding the types of eligible projects, it is probable that offset demand will exceed supply in the first compliance period.

Abbreviations

ARB: California Air Resources Board

CAR: Climate Action Reserve

RGGI: Regional Greenhouse Gas Initiative

GHG: Greenhouse Gas

† While AB 32 took effect January 1, 2012, compliance is delayed until January 1, 2013.

FOREST CARBON PROJECT TYPES

There are generally three types of forest offset projects. They comprise activities that either sequester additional carbon or prevent carbon dioxide from being released into the atmosphere. Note that not all carbon standards/registries include all four of these project types; some do not include any forest projects.

Afforestation/Reforestation (A/R):

Carbon sequestration through the creation (afforestation) or re-establishment (reforestation) of forests.

Reduced Emissions from Deforestation and Degradation (REDD):

Avoided carbon dioxide emissions via conservation of existing carbon stocks (i.e., avoided deforestation).

Improved Forest Management (IFM):

Carbon sequestration through the application of different forest management practices. Carbon stored in harvested wood products for longer than 100 years is also included in this project type.

Generally, improved forest management for carbon sequestration includes the following types of activities:

- Increasing the overall age of the forest by increasing rotation ages.
- Increasing the forest productivity by thinning diseased and suppressed trees.
- Managing competing brush and short-lived forest species.
- Increasing the stocking of trees on under-stocked areas.
- Maintaining stocks at a high level.

In the Northeast, forest ownerships that start at a high level of carbon stocking (i.e., high timber volume) relative to the regional average are more likely to generate carbon credits immediately under the two primary U.S. carbon standards. This is because protocols such as the CAR Forest Project Protocol (v3.2) favor well stocked forests, while those that have been recently heavily harvested rely on the growth of forests to generate credits (see figure below, CAR). In the figure below, the A forest starts off well above the regional average for a given forest type. Under the CAR protocol, the difference between the starting stocks and the regional average (minus deductions for risk, leakage, and the buffer pool) can be claimed right away. Not so for the B forest where stocking starts below the average. In this case, eligible carbon credits depend upon forest growth rates (only around 1 to 3 metric tons of CO_2 equivalent per acre per year depending upon stand age and forest type.).[17]

Abbreviations

A/R: Afforestation/reforestation

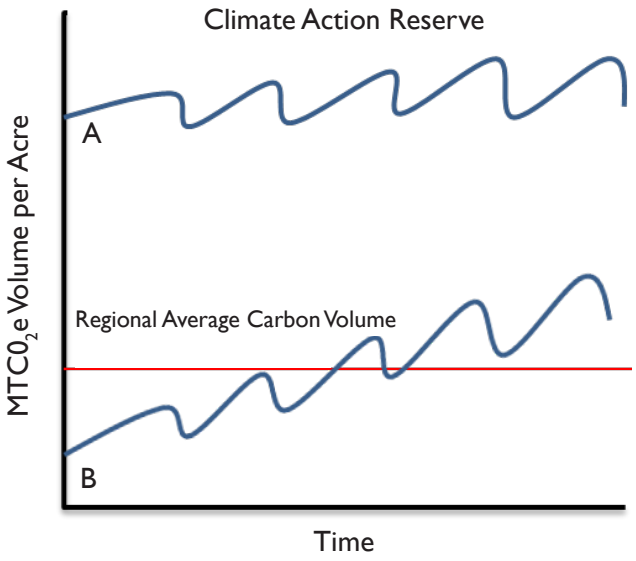
REDD: Reduced Emissions from Deforestation and Degradation

IFM: Improved forest management

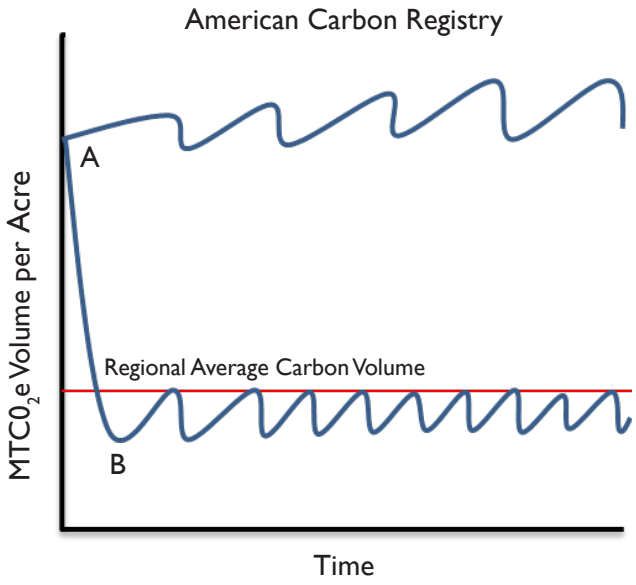
CAR: Climate Action Reserve

ACR: American Carbon Registry

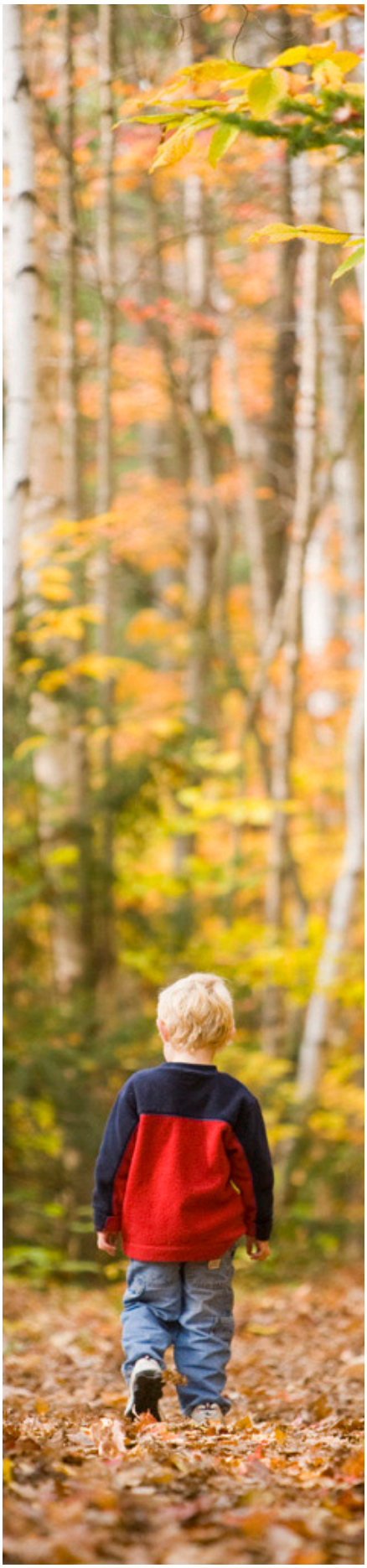
NPV: Net Present Value



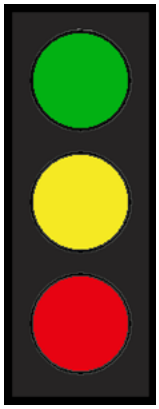
*Figures adapted from presentation,
Graphics provided by Dylan Jenkins, Finite Carbon



Calculations are made differently under the ACR Forest Carbon Project Standard (v2.1), but still favor well-stocked forest ownerships at the start of the project. The calculations are complex: the eligible credit is calculated by estimating the difference in volume between a planned management trajectory (A) over time and a trajectory (B) that tries to maximize the Net Present Value (NPV) of management (see figure above, ACR). Deductions for risk, leakage, and buffer pool must still be made. It is clear from the figure above that under either system, credit eligibility is maximized when starting carbon stocks are high relative to the "average" acre of forest in the region.



Could I sell carbon offsets from my forest?



Possibilities are good if your land:

- Is over 2,000 acres
- Has high timber volumes compared to others in the region
- Is not encumbered by an existing easement restricting timber harvest

Maybe, if your land:

- Is less that 2,000 but more than 500 acres in size
- Has recently been harvested
- Is encumbered by an easement restricting some—but not all—timber harvest

Probably not, if your land:

- Is less than 500 acres
- Has recently been heavily harvested
- Is encumbered by an easement preventing any future timber harvest

BRINGING A FOREST OFFSET PROJECT TO MARKET

Implementing a forest offset project requires many skill sets and activities, including forest management, measuring and monitoring carbon assets, data management, accounting, market analysis, deal brokerage, and finance. The details can vary depending on the project type and the standard used, but if you own or manage forestland and are interested in developing a forest offset project, the following summary may be helpful in understanding the process of bringing a legitimate forest offset project to market and understanding the resources available to help.

① *Project identification*

The first step in exploring a possible forest offset project is determining which type of forest project is compatible with your land and provides the greatest opportunities for generating offsets. There are three generally accepted forest offset project types: afforestation/reforestation, improved forest management, and avoided deforestation. If a landowner does not wish to be the project developer, this is a logical point at which to contract with an experienced, professional project developer to shepherd the project through the process (see www.northernforest.org/es_resources.html for links to current resources). It is important to consider, however, how much the services of a project developer will add to the overall project expense.

Resources

Landowners and foresters will find many helpful resources online at http://www.northernforest.org/es_resources.html, including links to websites, online tools, services, publications, and standards for forest carbon offset programs.

Please check the online Resources for the latest information.

② *Program research*

Once you have determined the project type, you need to determine which forest offset programs best meet your needs. First, determine which programs recognize your forest project type. Then, learn about the requirements of each and assess which is the most applicable to your project. For instance, program standards require different time periods for maintaining sequestered carbon (permanence) and others do not credit for carbon stored in wood harvested on project lands. The decision of which standard to use also will be influenced by the amount of land to be included in the project, as some programs do not allow project aggregation for smaller properties. (See sidebar at right.)

At this point, you might choose to discuss your project with a knowledgeable offset program staff person to ensure a good fit before making a final selection. This is also the step during which you should determine if the project will be financially feasible – will the revenue from selling offsets exceed the cost of creating them?

③ *Project registration*

Once you have selected an offset program for your project, you will have to understand the program's standard(s) and methodologies to ensure the project is developed and managed according to requirements. There will be documentation formalizing various aspects of the project and its management, including greenhouse gas accounting, monitoring, and verification plans, which the program will need to approve. When all necessary paperwork has been approved and the project has been verified according to program requirements, a project will be registered and can begin generating offset credits.

④ *Monitoring and verification*

While the timeframes and specific requirements may vary, programs require periodic project monitoring and verification. Typically, monitoring is required annually to ensure the land is being managed appropriately and the project is progressing according to the approved plan. Verification, conducted by an approved third party, is required to document the amount of carbon sequestration that has resulted from a forest project. There is usually a maximum allowable time period between verifications; at a minimum, verifications must be conducted before offsets can be issued. Verification can be conducted annually, but for small projects, the cost of verification compared to the quantity of offsets generated from one year to the next may necessitate less frequent verification.

Carbon Aggregation

A small forest owner (e.g., less than 3,000 to 4,000 acres) may be unable to sequester enough carbon on their land to create a sufficient quantity of saleable carbon offsets on their own. While one offset credit is equal to one metric ton of CO_2 equivalent ($MtCO_2e$), carbon is typically traded in 100 $MtCO_2e$.

Northeastern U.S. forests are estimated to sequester approximately 1 to 3 metric tons of CO_2 equivalent per acre per year depending upon stand age and forest type.[18]

Landowners unable to sequester a large volume of carbon on their own can participate in a process known as carbon aggregation. Carbon aggregation combines the carbon sequestered by multiple landowners, or from multiple projects under one owner, into a common pool for the purpose of market transactions. Some organizations serve as carbon aggregators to help landowners develop projects and undertake the carbon pooling and marketing process.

The details required for aggregation differ by program, but the Climate Action Reserve, American Carbon Registry, California Air Resources Board, and Verified Carbon Standard all allow some form of project or project activity aggregation.

⑤ *Crediting period and offset issuance*

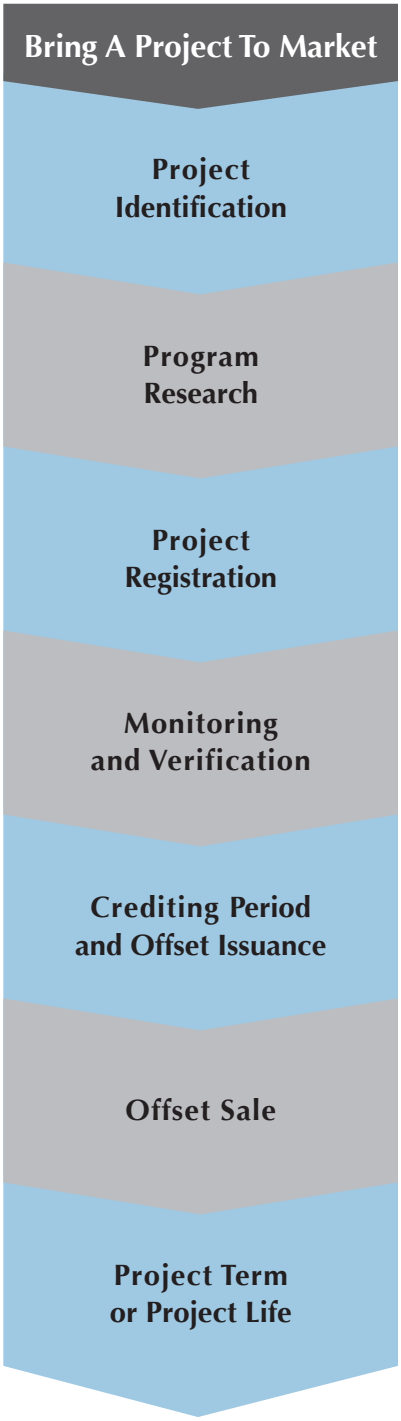
Each program specifies a crediting period, the time during which a project is eligible to generate offsets. Programs allow renewal of the crediting period if a project proponent wishes to continue generating offsets, but the number of renewals is typically capped. When you begin generating verified offsets, the offsets will be placed in the project's registry account. Registering offsets lends credibility and rigor to a project and enhances offset value in the marketplace. Each offset is issued a unique serial number in the registry which allows tracking of offset ownership, ensures offsets are not double counted, and enables offset retirement. When owners use their offsets to counteract an equivalent amount of emissions, the offsets must be retired to permanently remove them from the marketplace and ensure that no future claims can be made for using those offsets to counteract emissions.

⑥ *Offset sale*

An offset may be sold any number of times before it is ultimately retired. The sale of project offsets is usually transacted separately from the offset program. The program ensures the creation of verified offsets and a registry tracks the creation, sale(s), and retirement of offsets, but the actual sale transaction is handled by the project developer or an entity contracted to broker a sale. Transactions are conducted electronically resulting in the transfer of serial numbers from the seller account to the buyer account. Transaction fees differ by program and there are fees for brokerage services if you choose to use a broker.

⑦ *Project term (or project life)*

All carbon offset programs require a minimum time period for maintaining a project and conducting monitoring and verification. The project term typically begins on the date of project commencement when the project's emission reduction or removal activities began. The end date differs by program, assuming the project is not intentionally or unintentionally terminated prematurely. For instance, ACR's project term is 40 years, while ARB's and CAR's continue for 100 years after the last issuance of offsets, and VCS's project term is the crediting period (minimum 20 years to a maximum 100 years). Each program has its own rules and requirements for premature, intentional and unintentional project termination (reversal).



ACCOUNTING CHALLENGES OF FOREST CARBON OFFSET PROJECTS

Carbon offsets offer a cost-effective means for entities to meet their emission reduction goals. They can also be an effective tool for mitigating climate change, if developed using a standard that thoroughly addresses the critical issues of *additionality, permanence, and leakage* (see page 15 definitions). Forest offsets are particularly challenged by these issues. Unlike other offset project types in which CO_2 emissions can be instantly and permanently eliminated, forest projects involve the physical storage of carbon that takes time to accumulate and must be preserved for decades.

Each offset program deals with forest carbon accounting differently in their standards. Understanding these differences and their implications for your forest project are important considerations when selecting an offset program. Table 1 describes how four commonly used forest offset standards deal with the issues of additionality, permanence, and leakage.

The rigor of a standard is a major factor that determines project quality. Typically there is a trade off between the rigor of a standard and the expense involved in developing a project; however, higher quality projects may earn higher prices on the market. A landowner must evaluate the projected expense versus return of a project and determine a comfortable level of risk. Quality, demand, and whether the offsets are being sold in the voluntary or compliance market all interact to create a range of prices available to offset consumers.

Abbreviations

ARB: California Air Resources Board

ACR: American Carbon Registry

CAR: Climate Action Reserve

VCS: Verified Carbon Standard

Forest Project Accounting Challenges

Additionality is when carbon stocks achieved by a project exceed those that would have occurred in the absence of the project. It is the amount of additional carbon sequestered by a project which is sold as offsets. Additionality can be difficult to demonstrate for forest carbon projects and relies on establishing a carbon baseline against which the net change in carbon stocks can be quantified.

Permanence refers to the ability of a project to remove GHGs from the atmosphere for a significantly long time, in essence, perpetuity. This can become an issue with forest projects because of natural events such as hurricanes or wildfires, and because of management activities such as harvesting, that release stored carbon back into the atmosphere. Mechanisms to ensure permanence include deed restrictions on land use and long-term or permanent conservation easements.

Leakage occurs when a project causes emissions to increase in another location. While each standard has its own specific requirements for quantifying and mitigating leakage, typically a standard requires accounting for leakage only if it is above a certain threshold (referred to as de minimus). Two common types of leakage are market leakage and activity-shifting leakage.

Market leakage occurs when project activities cause a sufficient decrease in market supply of an emissions-causing product (e.g., timber) that production of that product increases elsewhere to compensate. Activity-shifting leakage occurs when emission-causing activities are moved to an area outside the project boundary. Leakage within a landowner's portfolio can be prevented by requiring that all forestlands under that ownership be included in any reporting. Leakage external to an ownership can be very difficult, if not impossible, to measure.

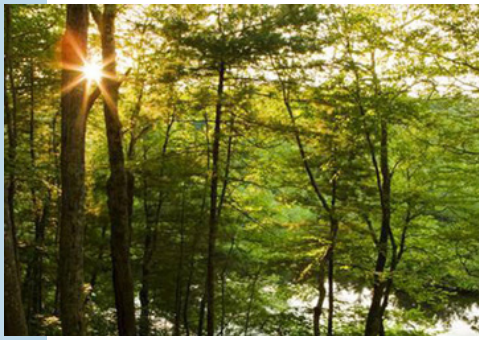


Table 1

Program Requirements for

American Carbon Registry (ACR v.2.1)

ACR is a non-profit carbon market registry founded in 1996 and operated by Winrock International.

Eligible forest projects include:

Afforestation/Reforestation

Improved Forest Management

Reducing Emissions from Deforestation and Degradation

Allows project aggregation and the addition of lands to a project over time ("programmatic project development approach").

California Air Resources Board (ARB)

The ARB is a state agency charged with implementing California's cap-and-trade program (AB 32), which took effect in 2012. The ARB's Compliance Offset Protocol for U.S. Forest Projects was built off CAR's Forest Project Protocol v3.2.

Eligible forest projects include:

Reforestation

Improved Forest Management

Avoided Conversion

Does not allow project aggregation.

Baseline & Additionality

The baseline is established by estimating the carbon stocks that would exist on project lands in the absence of the project (business-as-usual). Once a baseline is established, it is used to determine additional sequestration (offset credits) for the entire crediting period.

To establish baseline onsite carbon stocks, the forest owner must model 100 years of expected (business-as-usual) carbon stock changes in each of the forest project's required carbon pools.

Permanence

Project proponents are required to maintain carbon stocks for 40 years, the minimum project term.

A project-specific risk assessment determines the amount of credits that must be placed in the buffer pool, secured from an approved alternate source of offsets, or the level of insurance coverage that must be purchased.

A 100 year commitment from the date of the last credit issuance is required, along with annual monitoring and verification at least once every 6 years.

The percent of credits set aside as a buffer in case of a reversal is based on a project-specific risk evaluation and is reduced by the use of a qualified conservation easement or deed restriction.

Leakage

Certain types of leakage (i.e., activity-shifting and market) must be assessed, but the requirements and thresholds for accounting for and mitigating such leakage differ by forest project type.

Requirements for including activity-shifting leakage vary by forest project type.

Table 1

Forest Offset Projects in the U.S.

Climate Action Reserve (CAR v.3.2)

CAR is a voluntary carbon offset standard that grew out of the California Climate Action Registry, a voluntary carbon market created by the State of California in 2001.

Eligible forest projects include:

- Reforestation
- Improved Forest Management
- Avoided Conversion

Allows project aggregation for forest owners enrolling fewer than 5,000 acres.

Verified Carbon Standard (VCS v.3)

VCS was established in 2005 and offers standards and a registry system for creating verified voluntary carbon credits throughout the world.

- Eligible forest projects include:
- Afforestation, Reforestation & Revegetation
- Improved Forest Management
- Reduced Emissions from Deforestation and Degradation

Allows project grouping, whereby a project adds new instances of an activity after the project has been validated.

Baseline & Additionality

To establish baseline onsite carbon stocks, the forest owner must model 100 years of expected (business-as-usual) carbon stock changes in each of the forest project's required and selected optional carbon pools.

Methodologies for establishing the project baseline differ depending on the forest project type. They may include recent historical forest management practices, common practice, regulatory surplus, and evidence of practices that would likely have occurred in the absence of the project.

Permanence

A 100 year commitment from the date of the last credit issuance is required, along with annual monitoring and verification at least once every 6 years.

The percent of credits set aside as a buffer in case of a reversal is based on a project-specific risk evaluation and is reduced by the use of a qualified conservation easement or deed restriction.

The minimum commitment is 20 years with the option to renew up to four times for a maximum commitment of 100 years.

A project-specific risk assessment determines the percent of credits to be set aside in a buffer account in case of a reversal.

Leakage

Requirements for including activity-shifting leakage vary by forest project type.

All significant sources of market and activity-shifting leakage within the country must be assessed.

UNDERSTANDING THE COSTS OF DEVELOPING A FOREST CARBON OFFSET PROJECT

The expenses associated with developing a credible forest carbon offset project and bringing it to completion are significant. Understanding the amount and timing of these "transaction costs" is fundamental to making the decision to engage in the marketplace. Transaction costs can be categorized as:

- Initial costs associated with Project Identification, Program Research, and Project Registration (including initial inventory and forest carbon analysis;
- Periodic costs associated with Monitoring and Verification (including future inventory and analyses);
- Additional costs, such as those associated with the actual registration and issuance of an offset credit on a formal registry are significant, but will likely be borne by the broker or carbon credit buyer.

More specifically, initial costs can include time for consulting foresters to do the initial program research activities and the more technical aspects of conducting a detailed forest inventory and modeling the potential carbon benefits of management options. Other expenses include legal advice, third-party forest certification (such as Sustainable Forestry Initiative, American Tree Farm System, or Forest Stewardship Council), and third-party verification of the carbon project.

Periodic costs are likely to include the maintenance of an updated forest inventory and management plan, ongoing third party forest certification, and ongoing third-party carbon project verification (e.g., every 5-6 years). Some expenses, such as monitoring and reporting, may be incurred annually.

Depending on the size of the project (and parcel), initial costs can easily reach $70,000 to $100,000, with periodic costs exceeding $50,000 every 5-10 years.[19] While these expenses are significant, the initial costs in many cases are covered by a carbon broker or buyer in exchange for a share of the credits generated from the project. Engaging in this kind of arrangement requires an understanding of the costs that will be covered and the tradeoffs associated with relinquishing credits. Ultimately, the bottom line for a landowner comes down to an evaluation of the total project costs in relation to the market price per ton and the volume of credits generated from the project. Economies of scale are important, but higher market prices obviously will drive the threshold for landowner entry into the marketplace.

Forest carbon offset project transaction costs are presented in more detail in the table below adapted from the Manomet/Spatial Informatics Group Forest Carbon Forecaster spreadsheet tool (www.manomet.org/natural-capital-tools). Expenses are categorized by initial costs to establish a carbon project and periodic costs required throughout the life of the project (e.g., 40 or 100 years). Additional annual and other project-related costs are also shown, but many of those would likely be covered by a broker or buyer rather than by the landowner.

Summary of Potential Costs Associated

Initial Costs

Project Startup Costs ($)	Startup costs not captured in the categories below such as meetings, research, initial assessments and initial membership fees.
Inventory Cost ($/ac)	Cost of doing the initial forest carbon inventory.
Forest Analysis ($/ac)	Costs associated with developing growth and yield estimates and harvest schedule for the baseline and project activity.
Forest Certification Cost ($/ac)	Initial cost to obtain third-party forest certification where required and not already obtained.
Legal Expenses ($/ac)	Cost associated with developing contracts and land title adjustments.
Verification Cost ($/ac)	Initial third-party carbon project verification cost.
Compliance Market Costs ($/ac)[§]	Additional initial costs (i.e., additional verification, fees, reports) required for participation in a compliance (cap-and-trade) market.
Aggregator Initital Cost ($/ac)[§]	Initial cost associated with projects that are aggregated across more than one landowner; fees paid to aggregator for this property only.

Periodic Costs Associated with Verification Cycle

Periodic Inventory Cost ($/ac)	Cost of doing future forest carbon inventories.
Future Forest Analysis ($/ac)	Cost associated with updating growth and yield estimates and the harvest schedule for the project activity and baseline when required.
Periodic Certification Cost ($/ac)	Future periodic cost for third party certification where required and not already obtained.

with a Forest Carbon Project¥

Periodic Costs Associated with Verification Cycle *(continued)*

Periodic Legal Expenses ($/ac)	Cost associated with developing future contracts.
Periodic Verification Cost ($/ac)	Future carbon project third-party verification cost.
Periodic Compliance Market Costs ($/ac)§	Additional periodic costs (i.e., additional verification, fees, reports) required for participation in a compliance (cap-and-trade) market.
Periodic Aggregator Cost ($/ac)§	Ongoing periodic cost associated with projects that are aggregated across more than one landowner (possible fees paid to aggregator).
Annual Reporting Costs ($)	Annual reporting costs for years when not formally third-party verified.
Annual Membership Fee ($)	Cost for the annual registry membership fee.

Post-Project Monitoring Costs Associated with Monitoring Cycle§

Periodic Monitoring Cost ($/ac)

Post-Project Periodic Monitoring Costs ($/ac)

Transaction Costs Associated with Credits Traded

Brokerage Fee ($/tonne)

Insurance Cost ($/tonne)

Periodic Insurance Cost ($/tonne)

¥ Adapted from the SIG/Manomet Carbon Forecaster (www.manomet.org/natural-capital-tools)
§ Potentially covered by broker or buyer

LOOKING AHEAD

Payments for carbon sequestration present an opportunity for forest owners to gain a new revenue stream from their forests while reducing the impacts of climate change. Such payments also provide additional benefits:

- Landowners gain a supplemental income that could help to make working forests profitable, preventing the need to sell or develop land;
- Sustainable forest management is encouraged;
- The public gains the many services that healthy forestlands provide, such as clean water, wildlife habitat, and open space. There is the potential for the entire Northeast region to benefit.

At the same time, forest owners must be aware of the challenges that accompany forest carbon projects. Offset development can be complex and expensive. Given the high level of uncertainty regarding carbon regulation and fluctuating carbon prices, landowners should consider not only the potential return but also the financial risk associated with forest carbon projects. Carbon market professionals can help with this financial evaluation, as well as the many other aspects of bringing a project to market.

Looking ahead, there is both opportunity and uncertainty in the development of payments for forest carbon sequestration. Northeastern landowners are likely to benefit from thoughtful participation in carbon markets. By carefully engaging in cost-effective forest offset projects, forest owners and their communities can enjoy a multitude of benefits.

Resources

Landowners and foresters will find many helpful resources online at http://www.northernforest.org/es_resources.html, including links to websites, online tools, services, publications, and standards for forest carbon offset programs.

Please check the online Resources for the latest information.

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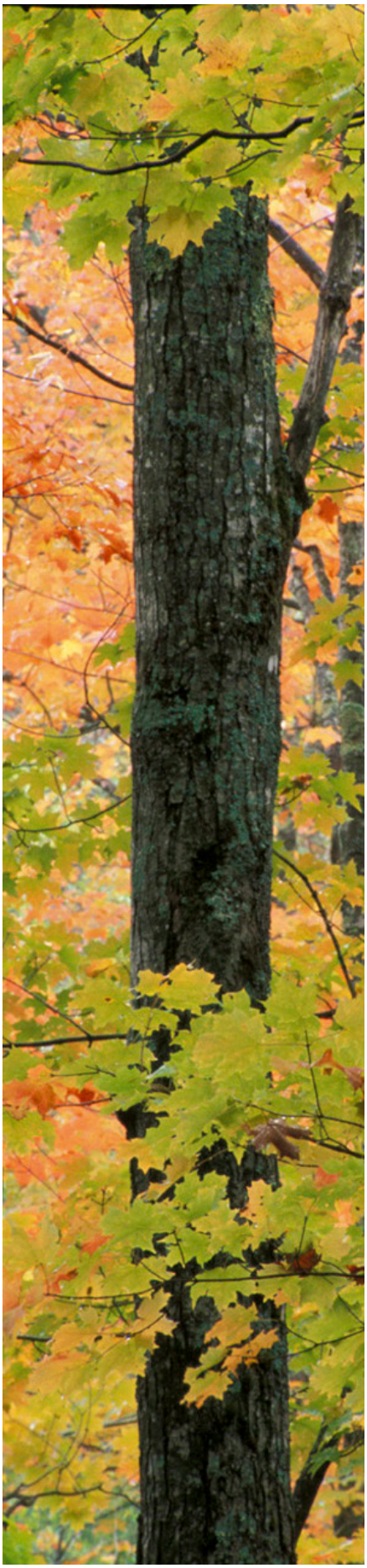

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Helpful Tools

The U.S. Forest Service has provided a collection of tools at www.nrs.fs.fed.us/carbon/tools/; additionally, Manomet Center for Conservation Sciences and the Spatial Informatics Group have created a pro forma financial tool to evaluate carbon market opportunities on private and public forestlands. The tool is intended to provide a first estimation of carbon market opportunities and the ability to test alternate scenarios to determine the conditions where carbon market entry may be possible. Available at http://www.manomet.org/natural-capital-tools).