



CARBON OFFSETS

A Viable Opportunity for Forest Landowners?

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THE DECARBONIZING GLOBAL MARKET

The global marketplace is decarbonizing. Decreasing costs and rapidly growing demand for wind and solar energy, electric vehicles, renewable biofuels, cellulosic nanomaterials and engineered wood products are lasting trends and highlight the vital role of forests and forest products in reducing greenhouse gas (GHG) emissions from human activity. However, GHG emissions are still rising in several of the world's largest countries and the transition to a low carbon economy will take decades. During that transition, voluntary and regulatory efforts to place a price on carbon emissions are an important part of the overall strategy to curb GHGs, and to spur innovation in low-carbon energy and products. The recognition of the environmental and social costs of GHG emissions and internalization of these costs into the production of energy and products has created a significant but momentary economic opportunity for some forest landowners.

In the 2013 issue of *The Consultant*, we posed the question of whether U.S. forest landowners had a viable path to the domestic forest carbon market. At the time, the voluntary forest offset market in the U.S. was relatively quiet after the demise of the voluntary Chicago Climate Exchange GHG trading system in 2010 and the delayed launch of California's GHG emissions trading program, aka Cap-and-Trade (C&T). Since that time, more than six million acres of U.S. forest have been listed for development as forest carbon offset projects under California's C&T program. And to date, nearly 60 million forest offsets worth more than \$500 million have been issued by California's Air Resources Board (ARB).

Forest landowners have received most of this revenue from carbon offsets created on their sustainably managed forests.

While scores of private forest owners of all types, i.e., non-profit, family, tribe, corporate, TIMO and REIT, across all regions of the U.S. have benefited from this new forest product, would-be participants still face headwinds in successfully navigating an ever-changing market for compliance offsets. With the assistance of their consulting foresters, many landowners are overcoming the barriers to access this potentially significant source of forest product revenue. The larger questions today are: Does the compliance offset market have staying power and should forest landowners participate?

FOREST CARBON OFFSETS DEFINED

Regarding a property's carbon performance and revenue potential, forest carbon offsets are fundamentally a forest product. Carbon offset production is a function of the same abiotic, biotic and managerial factors that influence conventional wood product flow and value: climate, geography, length of growing season, soil fertility, species mix, genetics and harvest regime.

However, forest carbon markets and offsets are distinct from conventional forest product markets in two important ways. First, unlike conventional wood product markets that are supported by the invisible hand of global demand from billions of consumers, offsets only exist in the context of either a self-imposed (voluntary) or government imposed (regulatory or compliance) framework that caps and places a cost on GHG emissions. In a compliance framework, this GHG emissions cap is imposed on either a specific economic sector, as is the case of the Northeast's Regional Greenhouse Gas Initiative on fossil fuel based electricity generation across nine Northeastern states, or across an entire jurisdiction's economy, i.e., on manufacturers,



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Robert Bradbury, ACF,
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Massachusetts
Audubon IFM Carbon
Project site verification.

transportation and fuel refineries, as is the case with the state of California. Second, the potential carbon volume that may be monetized from a forest is a function of a complex set of rules that defines the “additional” (rather than the total) amount of carbon in a forest over a baseline scenario.

Whether in the voluntary or compliance offset market, a forest carbon offset is created when a landowner’s voluntary action results in the sequestration or the prevention of carbon dioxide from being released into the atmosphere. This additional carbon volume, which is quantified and then monetized, is referred to as a carbon offset or credit, measured in metric tons of carbon dioxide equivalent (MtCO₂e) and is the unit of trade on most of the world’s carbon markets.

Forest offset project types include improved forest management (IFM), avoided conversion (AC) of forestland to a non-forest use and afforestation/reforestation (AR). Challenging eligibility requirements for AC and high capitalization costs and extended ROI horizon for AR make these two project types a limited opportunity for most forest owners. At least over the next several years, IFM projects will continue to contribute most of the compliance offsets demanded under California’s C&T program.

As the names of these project types imply, forest carbon projects are designed to encourage landowners to manage their forests in a manner that increases and maintains forest stocking at or above a “business as usual” level. That is, a level higher than the landowner could or would have maintained had they not committed to the carbon project. Under modern forest carbon standards, actions that qualify forests for offset projects include commitments to maintain forest in forestland use

(e.g., conservation easements), enrolling in forest certification programs, extending rotations, managing for long lived wood products and reduced harvesting in special areas or across entire ownerships. From the landowner’s perspective, a carbon offset project is essentially a supply agreement where the landowner is compensated to maintain a minimum stocking level for a specified period. From the buyer’s perspective, a forest carbon offset is a cost containment mechanism relative to their other GHG emission reduction options.

STATE OF THE NORTH AMERICAN COMPLIANCE CARBON MARKET

The U.S. carbon market is divided into voluntary and compliance sectors. Voluntary buyers purchase offsets to demonstrate corporate social responsibility and strengthen their connection to buyers of their products. Compliance buyers purchase offsets to satisfy a legal obligation to meet mandatory GHG emissions targets. The market for voluntary offsets remains a small fraction of the U.S. carbon market. While the global voluntary market saw substantial growth between 2005 and 2008, the recession and political uncertainty caused it to scale back significantly. The voluntary market has recovered somewhat from its low, but supply has always outpaced demand. In 2016, prices averaged \$2.90 per offset (all project types) and \$5.10 per offset (forestry and land use projects) with over half of all offsets remaining unsold.

Conversely, the market for compliance offsets continues to expand. Compliance markets are driven by industry- or economy-wide GHG emissions caps that are mandated by a government body. As the world’s sixth largest economy and 14th largest GHG emitter, California is notable as the largest

compliance market in the world allowing the use of forest offsets. California implemented its statewide GHG cap in 2013 with the goal of reducing statewide emissions to 1990 levels by 2020. Approximately 600 facilities are now covered by the C&T regulation and covered facilities must now account for their total annual GHG emissions. In 2016, California passed legislation to further reduce statewide emissions to 40 percent below 1990 levels by 2030 and in 2017 extended the C&T and offset program to 2030.

Through 2020, covered entities may use ARB-issued compliance offsets to meet up to 8 percent of their annual emissions obligations. However, the law passed by the California legislature in 2017 that extended the offset program to 2030 also reduced covered entities allowed use of offsets from 8 percent to 4 percent from 2021 to 2025, increasing to 6 percent from 2026 to 2030. Further, at least half of the offsets used by a covered entity during the 2021 to 2030 program period must then be sourced from projects providing “direct” air and water quality benefits to California, which is currently interpreted as projects based within California.

The unintended, but likely impact is the creation of two distinct but parallel offset markets. California-based projects will now enjoy guaranteed demand while out of state projects could generate a surplus of credits. However, the likely reduction in allowed use of out-of-state offsets by California covered entities may be somewhat mitigated by the linkage of California’s C&T program to other jurisdictions’ programs. For example, Quebec linked with California in January 2014 and Ontario will likewise join their C&T program with California and Quebec in January 2018. Because the majority of forestland in Canadian provinces is Crown owned and forest offset protocols are not currently in place in either province, linked Canadian jurisdictions will, for now, likely be net buyers of compliance offsets, which is good news for U.S.-based forest projects. Both Oregon and Washington state are also currently contemplating C&T programs that would link with California, Quebec and Ontario.

Covered entities in California may meet their annual GHG emissions goals through a combination of pollution control technologies, emissions fees paid directly to the state via the purchase of “allowances” and through the limited use of offsets as described. The cost of low carbon production technologies is decreasing and therefore these technologies are being adopted in new energy and manufacturing facilities and facility upgrades. However, low carbon technologies are still relatively expensive at \$50-100+ per MtCO₂e. For GHG emissions remaining after adoption of control technologies, entities may purchase a combination of allowances and offsets. A limited number of California Carbon Allowances (CCAs) are sold at a quarterly auction and for most entities satisfy 92 percent or more of their emissions obligation. CCAs have a floor price established by the state, which as of 2017 is \$13.57 per ton and increases by five percent plus inflation per year. California Carbon Offsets (CCOs) have no floor price, have historically traded at a 15 to 30 percent risk adjusted discount to CCAs, and are therefore the lowest cost emissions compliance mechanism for covered

entities. From the first CCO issuance in September 2013 to October 2017, CCO prices have gradually increased from a low of \$8.75 to over \$12 per offset (Figure 1).



Figure 1. California Carbon Allowance and broker-quoted California Carbon Offset prices (2013 Q3 to 2017 Q4; CaliforniaCarbon.info).

Significant offset transaction costs translate to less than 100 percent potential offset utilization rates, especially among entities with relatively small emissions obligations. Consequently, market reporting service CaliforniaCarbon.info estimates total offset demand for California’s first program period (2013 through 2020) at approximately 180 million tons, less than the 220 million tons forecast in 2013. To date, more than 83 million California Carbon Offsets (CCOs) have been issued by the California ARB, of which nearly 60 million are from forest projects across the U.S. (Figure 2). Ninety-eight percent of forest offsets issued to date are from IFM projects, and most of the remaining volume demanded will likewise be supplied from IFM. Under the 2021 to 2030 program period where offset use will be constrained, initial forecasts by CaliforniaCarbon.info and the American Carbon Registry place potential offset demand for California in-state, domestic non-California and Canadian linked jurisdiction (Ontario and Quebec) offsets at approximately 70 million, 70 million and 46 million offsets, respectively.

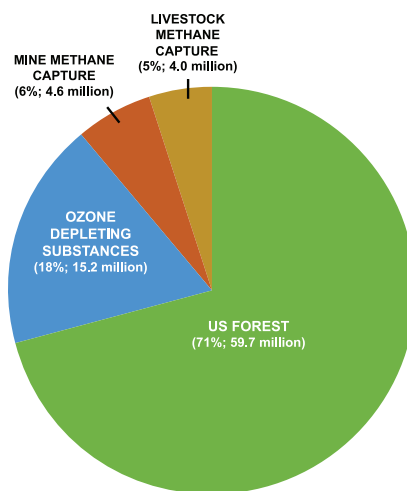


Figure 2. California Carbon Offsets issued by offset project type (2013 Q3 to 2017 Q4; CaliforniaCarbon.info).

While compliance projects based in California have been awarded the most forest offsets to date, large volumes have also been issued to landowners in Washington, Maine, Arizona, West Virginia, Virginia, Michigan and South Carolina, demonstrating that private landowners from all U.S. regions are successfully participating in the program (Figure 3).

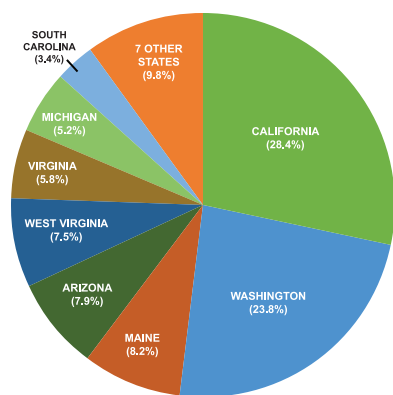


Figure 3. California compliance forest carbon offset volume issued by state (2013 Q3 to 2017 Q4; *CaliforniaCarbon.info*).

IMPROVED FOREST MANAGEMENT PROJECT FUNDAMENTALS

As the world's largest GHG compliance trading program to accept forest offsets, and with increasing linkage to other C&T programs, California's compliance offset program remains the most viable path for U.S. landowners to realize carbon offset revenue. In addition to the fundamental concept of additionality described earlier, major eligibility and forest management requirements for California IFM projects are as follows:

- **Ownership.** The primary opportunity remains on private forestlands, including tribal trust and fee forests. Non-federal public forests are eligible, but must adhere to a more stringent additionality standard than that used for private forestlands, and that essentially precludes public land participation in the program.
- **Commencement date.** Actions that trigger the start of a project include a change in ownership, recording a conservation easement or, most common, committing to the carbon project itself.
- **Location.** Forest projects may be developed anywhere in the continental U.S., and southeast coastal Alaska.
- **Project commitment.** Also known as "permanence," or project life, ARB requires that projects maintain credited carbon stocks for 100 years. Periodic inventories and verifications are required to demonstrate that committed carbon stocks and other program conditions are being met and are the primary costs associated with program compliance.
- **Forest use protection.** AC projects require a qualified conservation easement naming ARB as a third party with standing to enforce the easement. IFM projects do not require an easement, but may receive more offsets if a qualified easement is present due to the additional layer of project protection from land use conversion. Easements that predate IFM project commencement only impact project performance to the degree that the easement restricts harvesting.

- **Sustainable forest management (SFM).** For forests that are commercially harvested, SFM requirements include: (1) maintaining a management plan across all landowner holdings that is (a) certified under SFI, ATFS or FSC, (b) prepared and enrolled under a state or federal forestry program (e.g., Stewardship Program or land use taxation program) or (c) adheres to uneven-aged harvest as defined by the offset protocol; and (2) that even-aged harvests defined as 50BA or less residual stocking be no greater than 40 acres with a green-up buffer requirement. It is critical that landowners adhere to the SFM requirements from project commencement onward. Failure to follow the SFM requirements will make a project ineligible to receive offsets. This is especially important for IFM projects during the first reporting period when a major portion of project offsets are issued. Project owners can minimize their exposure to potential violations of the SFM requirement by ceasing commercial harvesting during the first reporting period.

THE IFM PROJECT DEVELOPMENT CYCLE

At a minimum, end-to-end project development requires an integrated knowledge of inventory design and implementation, carbon modeling, economic analysis, GIS, verification management, and offset marketing and transactions. Whether paying a service provider to develop some portions of a project or working with a turnkey developer like Finite Carbon who is paid a success-based fee in offsets, it is important that landowners work with a project partner who has the experience to determine if a project is viable, establish transparent and clearly defined commercial terms, and align incentives between both parties to eliminate surprises and ensure project success.

Feasibility. While the compliance offset market has matured and many service providers now more fully understand their respective roles and the forest offset protocol, the cost of project development has only increased, with initial costs exceeding \$150,000-250,000+ for even smaller projects and long-term project maintenance and operations costs starting at \$300,000+ in today's dollars. Therefore, before diving into project development it is imperative that a landowner receive a realistic and accurate appraisal of potential carbon performance before committing to the program's lengthy and exacting requirements.

Feasibility studies can be performed on a fee basis or, if working with a developer, may come at no charge or obligation to the landowner. Most evaluations of project potential are completed using the owner's most recent inventory, current forest management plan and GIS shape files. Since the inception of the compliance program, increasing project cost and complexity has resulted in a rising threshold for project viability. At current prices of \$11+ per offset, minimum feasibility requirements for an ARB IFM project throughout most of the U.S. are 5,000+ acres, stocking at or above regional common practice and conservative management, meaning harvest is less than growth when considered across the entire project area. An accurate assessment of project potential cannot be overstated

and is key to successful planning and decision making. Our firm takes a conservative approach to feasibility, meaning an accurate and realistic estimation of offset delivery and pricing tempered against a full accounting of project development and long-term operations and maintenance costs.

Project development. Once project feasibility has been established and a developer engaged, a project is listed with an offset project registry. Listing a project, which is akin to obtaining a building permit, requires submittal of information regarding project type, location, ownership, forest types, and condition and estimated performance to the registry to ensure the project meets eligibility requirements. After listing, project development hits the ground with the design and installation of a carbon inventory. Carbon inventories differ from most conventional inventories in that all standing above and below ground and standing dead carbon stocks must be quantified. Further, data must be collected in a manner that allows for the development of statistically defensible carbon stock estimates meeting the protocol’s demanding requirements and that prepares the inventory for initial and long-term verification and monitoring.

Following carbon inventory, the modeling and project documentation phase begins. Inventoried onsite carbon stocks are modeled and averaged over a 100-year project period and then compared against the common practice stocking level for the region. The difference between the project’s onsite carbon stocks during the first reporting period and common practice stocking for the region equates to the project’s initial offset volume. Thereafter, annual offsets credited to the project are a function of how a landowner manages their forest’s net annual biological growth. Growth retained in the forest may be quantified, verified and sold as additional offsets in subsequent reporting periods.

Project development next advances to preparation of the Offset Project Data Report (OPDR) and project verification by an independent auditor. The OPDR details all aspects of the project inventory and modeling process, asserts the offset volume for which the project is eligible and is the primary document used for verifier and regulatory review. Like forest certification, all offset projects must undergo initial and periodic audits by an independent verification body that is accredited by the California ARB. The verifier conducts a comprehensive site visit to ensure that inventory methodologies and field measurements match the procedures and support the carbon volumes asserted in the OPDR. A desk audit is also conducted examining the OPDR, ownership records, and other documentation to ensure all protocol standards and procedures were followed. Full field verifications are required every sixth year and desk audits of OPDRs are conducted in intervening years when landowners want the regulator to issue annual offsets.

Once a project has been successfully verified, an offset verification statement (OVS) is issued to the project registry which serves as an intermediary between the project

development team and the regulator. The registry reviews the OVS and then delivers all project documentation, including the OPDR and OVS, to the regulator for final regulatory review. Registration is the final phase of project development and results in offsets being issued by ARB to the project owner. Under California’s offset program, an OPDR must be submitted to the regulator every year attesting that the onsite carbon stocks within the project area are being maintained in compliance with the offset regulation and protocol.

Offset transactions. Compliance-grade offsets are currently in high demand and offset marketing generally occurs well before a project is registered and offsets are issued. As a commodity, forest offsets may be sold as they are issued by the ARB, held for possible price appreciation or a combination of the two. There is no commodity exchange for compliance offsets; rather, all transactions are direct party-to-party, over-the-counter (OTC) trades. Therefore, as with timber, it’s incumbent on sellers to conduct their due diligence and secure knowledgeable, experienced and impartial representation when negotiating offset sales agreements.

FOREST CARBON PROJECT RETURNS

Like consulting foresters, offset project developers are frequently asked to speculate on potential project returns with little property-specific data upon which to render an informed opinion. While rules of thumb are scarce in the forest carbon industry, having evaluated over eight million acres of U.S. timberlands and developing more than 30 IFM projects on 2.5 million acres, regional performance trends have emerged (Table 1).

Project Name	Berry Summit LLC	Shannondale Tree Farm	Moro Big Pine	Brosnan Forest	Grand Lake Stream	Connecticut Lakes	Colville
Location	California	Missouri	Arkansas	South Carolina	Maine	New Hampshire	Washington
Landowner	Berry Summit LLC	United Church of Christ; Mid-Missouri Conference	Pottlach Corporation	Norfolk Southern	Downeast Lakes Land Trust (formerly owned by Lume Timber)	The Forestland Group	Confederated Tribes of the Colville Reservation
Landowner Type	Private	Church	REIT	Corporate	Land Trust/TIMO	TIMO	Tribe
Project Size (acres)	2,141	3,937	15,809	12,488	19,552	141,0622	487,417
Initial Offsets (net to project)	193,300	123,300	220,200	282,600	485,400	1,165,600	12,163,500
Annual Offsets	10,800	2,500	20,000	10,900	19,000	confidential	confidential
ARB Registered	3/2016	9/2015	12/2013	11/2015	8/2016	12/2014	9/2017
Forest Types	Douglas-fir, tanoak, madrone	Oak-Hickory, Mixed Oak-Pine	Loblolly and shortleaf pine, Oak-gum-cypress	Loblolly and longleaf pine, Oak-gum-cypress	Northern hardwoods, Spruce-fir	Northern hardwoods, Spruce-fir	Douglas-fir mixed conifer, subalpine mixed conifer
Primary reasons landowner pursued project	Proof of concept to demonstrate carbon finance for property acquisition	Demonstrate low carbon commitment to public and membership; fund stewardship	Diversity ROI, fund stewardship	Demonstrate low carbon commitment to public and membership; fund stewardship	Fund land acquisition, conservation easements, and stewardship	Diversity ROI, fund stewardship	Fund Community economic development projects and post-wildfire restoration

Table 1. Characteristics of example registered Finite Carbon IFM offset projects.

A fortunate and unique feature of IFM offset projects among other offset types is that a large proportion of total project volume and revenue is front-loaded for most projects. This is due to a conservatively managed property’s initial onsite carbon stocking being above common practice, often to a significant extent. Once a project is registered, annual offsets are a more modest yield based on site productivity, growth rates and the amount

of annual growth retained on the project property. In short, the more favorable the growing conditions for conventional wood products, the more favorable the conditions for forest carbon offsets. That said, even the best growing conditions can't overcome management approaches where harvesting regularly exceeds growth for extended periods. Conversely, tenures of relatively conservative management on large acreages in poorer growing conditions can yield exceptional carbon projects.

Forest landowners of all types and from all regions of the U.S. have successfully developed and registered forest offset projects (Table 2). Offset projects are not a fit for every landowner, nor will every forest perform under the eligibility rules and feasibility constraints of the compliance offset protocol. But landowners from every corner of the U.S. have demonstrated that habitat conservation, industrial timber management and carbon yields can co-exist on the same property and complement traditional financial returns. Many landowners are discovering that conservation values and long-term sustainable management can have synergy with the compliance carbon offset market.

A VIABLE OPPORTUNITY FOR U.S. LANDOWNERS?

Our experience in the compliance market across the U.S. has only reinforced our conviction that active participation of consulting foresters is key to project success. Consulting foresters have a deep understanding of their clients' property, ownership goals and management approach. As the landowner's trusted advisor, the consulting forester is in the best position to assist the landowner in evaluating carbon opportunities, identifying an experienced and competent project service provider and serving as the landowner's liaison during the development process. While many consulting foresters lack forest carbon development experience per se, they are well-acquainted with several of the major components of carbon projects and can provide essential development services, specifically initial and periodic forest carbon inventories, integration of carbon projects into forest management plans and ongoing project accounting and reporting support.

Forest carbon revenue can diversify and complement a landowner's portfolio of forest assets and therefore stabilize and increase long-term timberland ROI. As both an asset and management strategy, forest carbon can be well aligned with active forest management if applied by knowledgeable practitioners in the right situation. However, several factors continue to create barriers to widespread landowner participation in carbon markets, notably high development and long-term operations and maintenance costs, overly complex and dynamic project standards and increasing verification and regulatory review periods. These barriers exist for all ownerships, but can be overcome in many cases with the proper alignment of essential property attributes and an experienced project team to guide the landowner through the project development process.

The world's economies will continue to decarbonize and forest offsets will be part of that effort. But recent changes to the North American compliance offset market leave much

Region	Project Revenue (\$/Acre)	
	1st Year	Annual
California/PNW	\$800-1200	\$20-40
Coastal Alaska	\$300-1000	\$10-20
InlandWest	\$200-1000	\$10-20
Southeast Hardwood	\$200-800	\$10-30
Southeast Softwood	\$150-200	\$10-20
Lake States	\$100-400	\$5-20
Northeast	\$100-300	\$5-10

Table 2. Approximate first year and annual IFM offset project revenue by U.S. region (revenue based on \$10/offset).

to be determined and beg the question: Should forest landowners participate? Projects originating in California are fortunate to have relative clarity on market viability through 2030. Outside California, uncertainty prevails and forces are working to both contract and expand the compliance offset market. In addition to increased jurisdictional linkage of C&T programs, a possible move toward market expansion is the nascent Carbon Offsetting Scheme for International Aviation (CORSIA). Significant as the first global GHG reduction program covering an entire industrial sector, CORSIA seeks to mitigate 1.3 percent of global GHG emissions in 2021 and upwards of 25 percent by 2050. Beginning in 2021, many of the world's aircraft operators will be required to purchase offsets to account for their increased emissions beyond 2020 levels. While CORSIA could create tremendous demand for forest offsets, final decisions on qualifying offset project types and protocols are still several years away.

While the market for forest carbon offsets has always been dynamic, our advice to potential participants remains unchanged. Landowners who meet compliance offset program eligibility requirements and manage their lands in alignment with protocol requirements should assemble an experienced team to help determine if an offset project is a fit for their property and institutional personality. When the point of decision arrives, project performance and landowner goals will be weighed against current offset rules and relative market strength. As the compliance offset market continues to transform and mature, the encouraging news is that this market has demonstrably rewarded forest landowners for their commitments to sustainable forestry and appears to have staying power. Moreover, landowners can now rely on an industry of knowledgeable and seasoned project developers and consulting foresters to navigate this evolving market. 🌱

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