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THE BUSINESS OF CARBON CREDIT TRADING FOR FOREST LANDOWNERS

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This publication provides an overview of carbon sequestration and helps inform forest landowners about the business of *carbon credit trading*.

Precautionary statement: Only those landowners with a serious and lasting commitment to long-term sustainable forest management should consider enrolling in a carbon credit trading program. It is a contractual agreement, lasting several years, with initial costs that may not be suited for all ownerships. Removing timber during the contract period will affect carbon sequestration rates, potentially resulting in a penalty. This program is funded by private investors, not the government, and these investors are counting on participating landowners to deliver a product: sequestered carbon. And like the stock market, prices paid for sequestered carbon fluctuate daily, with no minimum guarantees. Participants should seek full disclosure from their carbon aggregator of all potential benefits and risks prior to enrolling.

The 21st century is ushering in an indisputable shift toward *green*. Many businesses large and small, across disciplines, spanning the globe, are reconfiguring their mode of operation to meet the prospect of emerging *green* (ecosystem) markets. *Carbon credit trading* is an emerging ecosystem market from which some forest landowners may profit. This market could become sizeable if federal or state governments intervene to set mandatory targets for carbon dioxide (CO₂) reduction. It could also become less significant as industries change to be more successful in lowering their carbon emissions.

one metric ton of carbon and is the standard unit of measurement for carbon trading programs worldwide (for explanation, see <http://www.mtco2e.com/>). Foresters conduct inventories to compute timber volume, which is then converted to weight. Computer models then make adjustments for site productivity and growth, and the amount of carbon sequestered in a forest stand, and hence carbon credits earned, can be projected. In very general terms, most deciduous (hardwood) forests in the region sequester less than two tons of carbon per acre per year, while coniferous (pine) forests can be considerably more.

WHAT ABOUT CARBON STORAGE?

CO₂ is a compound that exists in the atmosphere. An assumption is being made in the scientific community that CO₂ and other greenhouse gas levels are increasing, and that continued increases could negatively impact the environment. This concern is leading to reductions in CO₂ emissions from the combustion of fossil fuels, while concurrently seeking ways to sequester (trap) carbon in long-term storage components, such as the ground or vegetation. Trees and forests sequester CO₂ in the atmosphere through photosynthesis. Growth rate, and hence carbon sequestration rate, is largely a function of tree species, stand age, site quality and stocking. For instance, carbon sequestration rate will be low in forest stands growing on poor sites and in significantly under- or over-stocked condition.

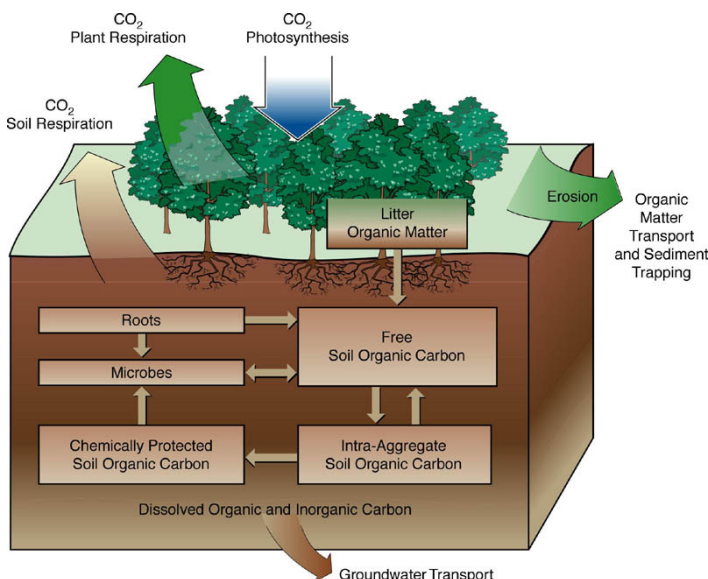


Illustration courtesy of: climatescience.gov.

HOW CAN CARBON BE MEASURED?

Landowners who choose to participate in a carbon credit trading program can earn and sell *carbon credits* as their trees grow. A carbon credit is the market term used for sequestered carbon. It is measured as a metric ton equivalent (Mte). An Mte is the unit of

Carbon credits have value to business entities who are seeking to offset their CO₂ emissions. Such entities may include power companies or other manufacturers that burn fossil fuels such as coal, natural gas or oil. In a cap and trade system that includes “offsets,” when an entity falls short of lowering its CO₂ emissions to a specific goal, they must purchase carbon credits either from another manufacturer (that has succeeded in reducing emissions beyond its goal), or from carbon sequestration projects that sequester atmospheric carbon (such as forests).

In order for forest landowners to sell carbon credits to one of these entities, they must gain access to a carbon market. The Chicago Climate Exchange (CCX) is the primary commodity-based trading market for carbon credits in the United States. Credits are traded by business entities (on large scale) or by carbon aggregators (on smaller scale) who are registered with the CCX. As with other commodity markets, prices paid for carbon credits fluctuate with market supply and demand, speculation, government intervention and even the timing of “settle-up” periods for cooperating manufacturers. For an update on carbon market prices, refer to the CCX Web site at:

<http://www.chicagoclimatex.com/market/data/summary.jsf>

WHICH TYPES OF FOREST PROJECTS ARE ELIGIBLE?

Currently there are three ways that forest landowners can participate in carbon credit trading:

- **Afforestation Option** – This includes the planting of trees to establish a new forest on land that was not previously forested – for instance, row crop or pasture land (Figure 1). Lands with trees planted after January 1, 1990 are eligible, including some federal conservation programs (Conservation Reserve and Wetland Reserve Programs). During the contract period, neither thinning nor harvesting of trees is allowed, unless the landowner transitions into the Sustainably Managed Forest option *prior* to thinning. Currently, afforestation is the only forest project that is receiving much consideration.
- **Sustainably Managed Forest Option** – This option includes existing forest lands that have been third-party certified as being sustainably managed (Figure 2). During the contract period, the growth in carbon stocks must exceed any removal from thinning, harvesting or mortality. The managed forest option has not received much attention and will require a change in international protocols for measurable landowner involvement.
- **Long-lived Wood Products** – Carbon credits can be earned on harvested timber that is used to produce long-lived wood products, provided there is sufficient and verifiable documentation. For instance, pine or hardwood sawtimber used for single-family home construction or household furniture are both long-lived products and would receive more carbon credits than would pulpwood used for paper products or pallets. Refer to Table 1 for a summary of the half-life for wood products by end use (Skog and Nicholson, 1998).

TABLE 1. DURATION OF CARBON SEQUESTRATION IN END USES OF WOOD AND PAPER

End Use	Half-life of carbon (yrs)
Single-family homes (pre-1980)	80
Single-family homes (post-1980)	100
Multifamily homes	70
Mobile homes	20
Nonresidential construction	67
Pallets	6
Manufacturing	12
Furniture	30
Railroad ties	30
Paper (free sheet)	6
Paper (all other)	1

Landowners can also market credits from soils in no-till farmland, CRP grass and new grassland sowed from farmland after 1999.

HOW CAN A FOREST LANDOWNER PARTICIPATE?

Tennessee forest landowners' participation in carbon trading is challenging and potentially expensive. Some states have developed a state registry, often in concert with a property tax abatement program, but Tennessee does not have such a program. Instead, landowners must enroll as individuals or become part of a certified group (such as with a participating consulting forester). Steps for participation in the program are as follows:

1. The property must first be certified as being sustainably managed by an approved certification system. Approved certification systems include the Forest Stewardship Council, the American Tree Farm System and the Sustainable Forest Initiative. Certification requires a detailed forest management plan and an on-site inspection confirming that the landowner is in compliance with sustainability principles. The plan and inspection may be free or with fee, depending on the certification system selected.
2. An inventory documenting the current carbon stock and projecting future growth (either by using a growth-and-yield model or by calculating growth via forest inventory on an annual basis) must be conducted. A professional forester is required to conduct an inventory and to project growth. A CCX-approved auditor must verify the estimated sequestration levels.
3. A contractual commitment that assures long-term sustainability is mandatory, perhaps as much as 15 years, with a penalty associated with breaching the contract.
4. A carbon aggregator *registered with the CCX* must be selected and then the project is registered on the CCX.
5. Carbon credits are traded by the registered carbon aggregator and periodic payments are made to landowners based on the predicted quantity of carbon credits earned. For insurance against carbon losses on the property (e.g., fire, tornado, mortality, etc.), 20 percent of the annual credits are withheld and placed in a reserve pool.
6. Landowners are required to give an annual update if any changes have been made to the forest that would alter the carbon stock (timber harvesting, or loss to natural disturbances).
7. An inventory at the conclusion of the contract quantifies the actual amount of carbon credits earned and allows for final settlement (with consideration of the 20 percent reserve pool).

AN ESTIMATE OF CASH-FLOW

Fees are associated with forest inventory (to a forester), aggregation and trading (to the aggregator), verification for compliance (to an auditor) and transaction fee (to CCX). Fees are variable, are sometimes spread across the group of participating landowners, and, in some cases, may even exceed the carbon credit revenue. Some of these fees are deducted from the gross revenue of carbon credits sales. Other fees, such as inventories and carbon modeling, are normally due upfront. The registered carbon aggregator typically charges a commission,



Figure 1. Afforestation option.



Figure 2. Sustainably managed forest option.

serving as a broker of accumulated sequestered carbon for a group of landowners. Thus the highest trading price benefits both parties. Credits are marketed annually and payments for those credits are issued annually, but considerable variation in the payments can be expected year-to-year.

Economies of scale exist with carbon credit trading. Larger, contiguous forest ownerships, uniform in stand structure, existing on high-quality sites and with rapidly growing trees, are more likely to realize the largest financial rewards from the program. Some costs are diluted as ownership size increases, and therefore participation can be prohibitive for smaller ownerships. Each situation will be different, so those considering the program should seek reliable counsel.

Table 2 gives an estimate of cash-flow for a landowner with 200 acres of forestland. This is given for demonstration purposes only, and readers should understand that input variables can fluctuate considerably. Both pine and upland hardwood scenarios are examined. The assumptions include: \$5 market price/Mte, inventory and calculation fee (\$6/ acre for pine, \$10/acre for hardwood), \$1500 auditor/verification fee, 10 percent trading fee + \$.20/ton CCX fee, and 20 percent placed in the reserve pool.

TABLE 2. ESTIMATED NET INCOME FOR PINE AND HARDWOOD SCENARIOS @ \$5/MTE

	Pine Scenario	Hardwood Scenario
Amount of carbon sequestered on 200 acres per year	4 Mte/ac/yr x 80% ¹ = 3.2 Mte/ac 3.2 Mte x 200 ac = 640 Mte	1.25 Mte/ac/yr x 80% ¹ = 1 Mte/ac 1 Mte x 200 ac = 200 Mte
Gross revenue for the stand/year	640 Mte x \$5/Mte = \$3,200	200 Mte x \$5/Mte = \$1,000
Inventory fee²	\$6/ac x 200 ac = -\$1,200	\$10/ac x 200 ac = -\$2,000
Verification fee²	-\$1,500	-\$1,500
Trading fee CCX fee	10% x \$3,200 = \$320 \$.20/Mte x 640 Mte = <u>\$128</u> Total -\$448	10% x \$1,000 = \$100 \$.20/Mte x 200 Mte = <u>\$40</u> Total -\$140
Net income year 1	\$52	- \$2,640
Net income year 2	\$3,200 - 448 = \$2,752	\$1,000 - 140 = \$860

¹ = accounts for the 20 percent reserve pool

² = year one only

From Table 2, for pine, a small profit is realized in year one with considerably higher profit in year two. However, in the hardwood scenario, due to the higher inventory fee and lower carbon sequestration rate, profit is delayed until year five (-\$2,640 + \$860 + \$860 + \$860 + \$860 = \$800). However, typically in year five, the inventory and verification fees will be due again, essentially eliminating the possibility of a profit. *This may not be the case for all hardwood scenarios.* The reserve pool, assuming funds still remain in it, is added back into the equation at the end of the contract, potentially improving the net income. The landowner’s alternative rate of return and income taxes on carbon revenue were not included in these scenarios.

The market price/Mte is the most difficult variable to predict. If the price of sequestered carbon increases to \$20/Mte, or decreases to \$1/Mte, the scenarios above would look strikingly different. Refer to Table 3.

TABLE 3. ESTIMATED NET INCOME FOR PINE AND HARDWOOD SCENARIOS @ \$20/MTE AND \$1/MTE

Carbon Market Price/Mte	Pine Scenario	Hardwood Scenario
\$20/Mte	Net income year 1 = \$ 8,692	Net income year 1 = \$ 60
	Net income year 2 = \$11,392	Net income year 2 = \$ 3,560
\$1/Mte	Net income year 1 = \$ -2,252	Net income year 1 = \$ -3,360
	Net income year 2 = \$ 448	Net income year 2 = \$ 140

CONCLUSION

Landowner revenues for traditional forest products may become flat or even decline and emerging ecosystem markets such as carbon credit trading could provide some offsetting revenue. The characteristics of each forested property can be considerably

different, potentially affecting the net revenue from the sale of carbon credits. Prudent landowners should keep a close and cautious eye on this developing market.

GLOSSARY OF CARBON MARKET TERMS

Afforestation: Planting trees on land that was previously used for crops or pasture.

Aggregator: A market-authorized trader who can collect and sell carbon credits.

Aggregation Fee: Fee charged by aggregator. Deducted from each enrollee's payment received from the sale of carbon credits.

Carbon Credit: A market term for one metric ton of carbon dioxide equivalent. Also known as Forest Exchange Offset.

Chicago Climate Exchange (CCX): North America's global marketplace for integrating voluntary, legally binding emissions reductions with emissions trading and offsets for all six greenhouse gases.

CCX Transaction Fee: Fee charged by CCX and deducted from each enrollee's payment received from the sale of carbon offsets through the CCX trading program.

Certification: An evaluation provided by a nationally recognized, natural resources-affiliated organization that confirms forests are managed sustainably on a long-term basis and not converted to other, competing uses.

Cap & Trade: An administrative approach used to control pollution by providing economic incentives for exceeding targeted reductions in the emissions of pollutants.

Forest Carbon Baseline: The quantity of carbon (expressed in metric tons CO₂ equivalent) stored on an individual property at the time of carbon program enrollment.

Inventory: Quantitative method used to estimate the actual volume, composition and market value of standing timber.

Metric Ton Equivalent (Mte): The unit of one metric ton of carbon; the standard unit of measurement for carbon-trading programs.

Pooled Projects: The total quantity of individual properties an aggregator represents.

Sustainably Managed Forests: Forested land harvested in accordance with an approved forest stewardship plan, forest certification and a current forest inventory.

Verification Fee: A fee paid by a landowner to an independent, third-party auditor, approved by the CCX, to confirm sequestration levels.

Verifier: A technical expert, approved by market or registry, who verifies the amount of carbon offsets an aggregator calculates is present on an individual property.

USEFUL WEBSITES AND REFERENCES

AgraGate Climate Credits Corporation: www.agragate.com

American Tree Farm Certification
http://www.treefarmssystem.org/cms/pages/26_19.html

Carbon dioxide and the earth's atmosphere: http://en.wikipedia.org/wiki/Carbon_dioxide_in_the_Earth's_atmosphere

CCX Carbon Market Data: <http://www.chicagoclimatex.com/market/data/summary.jsf>

U.S. Environmental Protection Agency: <http://www.epa.gov/sequestration/>

Forest Carbon Portal: <http://www.forestcarbonportal.com/>

Forest Stewardship Council Certification:
http://www.fscus.org/faqs/what_is_certification.php

Metric Tonne Carbon Dioxide Equivalent: <http://www.mtco2e.com/>

Skog, K. and G. Nicholson. 1998. Carbon Cycling Through Wood Products: The Role of Wood and Paper products in Carbon Sequestration. Forest Products Journal. Vol. 48, No. 7/8. <http://www.fpl.fs.fed.us/documnts/pdf1998/skog98a.pdf>

Sustainable Forestry Initiative Certification: <http://www.sfiprogram.org/standard/index.php>

Southern Regional Extension Forestry: <http://soforext.net/courses/certification/>

Tennessee Timber Consultants: <http://tennesseetimber.com>

USDA Forest Service: <http://www.fs.fed.us/ecosystems/services/carbon.shtml>

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