Carbon Accounting: A Practical Guide for Lawyers

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The stars appear to be lining up for passage of climate change legislation in the next year or two. We could back this prediction with a wonkish reading of congressional tea leaves (e.g., industry support for climate change legislation through coalitions such as the U.S. Climate Action Partnership, the Democratic majority in both houses, and pressure by Republican incumbents on the president not to veto climate change legislation because they fear that a presidential veto could hurt their chances in the 2008 elections). But perhaps equally compelling is how the climate change issue appears to be following the typical trajectory of new environmental laws. First, scientists identify the environmental issue. Then environmental activists amplify the scientists' findings. Next the environmental issue is featured on the cover of *Time Magazine*. Progressive states, typically California and/or New Jersey, enact laws. The resulting patchwork of state regulation causes Congress to begin the search for a national solution. Finally, some cataclysmic event (Love Canal, Bhopal) tips broad public opinion from ambivalence to insistence that Congress act.

Climate change has crossed most of these familiar thresholds. Most scientists had reached consensus on man's role in climate change by the start of the twenty-first century. Former Vice President Al Gore's film, *An Inconvenient Truth*, certainly amplified the scientists' findings. Climate change stories have graced the cover of *Time Magazine* on numerous occasions during the past few years. In 2006, California enacted Assembly Bill 32, which mandates that state sources of carbon dioxide (CO_2) reduce emissions to 1990 levels by 2020. In 2007, there were more than 110 climate-related hearings in Congress and 150 bills mentioning climate change. For coverage of developments in Congress, see Energy and Environment Daily, www.eenews.net/eed/, or Pew Center on Global Climate Change, What's Being Done in Congress, www.pewclimate.org/what_s_being_done/in_the_congress/. All that remains to complete the cycle is the climate-change-driven cataclysm, although some consider Hurricane Katrina to be such an event.

Most of the climate change bills that were introduced in Congress during 2007 feature cap-and-trade mechanisms to reduce emissions of CO_2 and other greenhouse gases (GHGs). Under the cap-and-trade concept, a ceiling is established for total emissions of GHGs by covered emitters. The emitters are then assigned some portion of the total allowable GHG emissions and must either reduce their GHG emissions to meet their limit or acquire offsets to cancel out their excess GHG emissions. Such offsets typically are either emission reduction "credits" acquired from other regulated emitters that were able to reduce GHG emissions below their ceiling, offsets from unregulated emitters (e.g., methane capture from landfills), or offsets from carbon sequestration activities, which remove CO_2 from the atmosphere and convert it to nongaseous "carbon sinks."

If Congress enacts a cap-and-trade scheme, as many observers predict it will, a massive new market in carbon emission credits will be created overnight. Some observers estimate the total market in the United States at $300 billion. The stakes obviously will be enormous, and there will be significant financial pressure on companies to reduce their carbon footprints. Environmental lawyers, both in-house and outside, will need to understand the basics of carbon accounting to advise clients confronting a carbon-constrained economy: how to determine the baseline emissions of an entity (also known as the carbon footprint), how to identify the options for reducing the carbon footprint, and how to calculate and certify the carbon emission reductions associated with each of those options. Without a basic understanding of these methods and the assumptions upon which they rely, it is not possible to assess short- and long-term project benefits, determine whether project investments are justified, or effectively negotiate transactions or otherwise advise clients in this field.

Ten years have passed since the Kyoto Protocol was adopted in 1997. So one might logically assume that a robust body of generally accepted carbon accounting principles has been developed and that the rules of the road are clear. To the contrary, the rules remain murky and mired in controversy. This article will discuss different accounting methods and the key concepts upon which they rely (e.g., baselines, additionality, leakage, and permanence), focusing principally on carbon sequestration projects in the forestry sector to illustrate these principles. The purpose of this article is to provide a practice guide to the various accounting methods and to illustrate their application. It is not intended to be a discussion of complex economic theories or a prediction of where policy may ultimately settle.

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Basics of Carbon Accounting

Because carbon offsets are intangible commodities, GHG accounting standards are necessary to ensure that GHG reductions are transparent, representative of actual emissions reductions, verifiable, permanent, and enforceable. In other words, accounting standards must ensure that "a ton of carbon is always a ton of carbon."

GHG accounting standards have been developed for a wide variety of trading schemes and programs, e.g., the U.S. Department of Energy (DOE) National Voluntary Greenhouse Gas Reporting Program (also referred to as the "Section 1605(b) Emission Inventory"), the World Bank Prototype Carbon Fund Guidelines, the American Petroleum Institute Emissions Estimating System (known by the trade name "SANGEA"), and the UK Emissions Trading Scheme Regulations. The standards generally reflect the program goals for which they were developed. Unfortunately, these program-specific standards are not necessarily consistent with one another.

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The World Resources Institute/World Business Council for Sustainable Development (WRI/WBCSD) Greenhouse Gas Protocol Initiative and the International Organization for Standardization (ISO) have attempted to harmonize the multiple accounting standards in use to provide a single set of standards that can be used in a variety of contexts. In December 2005, the WRI/WBCSD Greenhouse Gas Protocol Initiative published its *GHG Protocol for Project Accounting* (Project Protocol) as a companion to its *GHG Protocol Corporate Accounting Standard,* which is widely used for preparing GHG emissions inventories. Both standards are available at The Greenhouse Gas Protocol Initiative, www.ghgprotocol.org/standards. In March 2006, the ISO released its "14064 Part 2" carbon accounting standards. www.iso.org/iso/catalogue_detail?csnumber=38382. Both the Project Protocol and ISO 14064 Part 2 were developed through a multistakeholder process and provide a succinct set of basic, verifiable requirements that must be met to fully account for project-based GHG reductions. Although the Project Protocol and ISO 14064 Part 2 differ somewhat in the terminology used and the requirements imposed, they are very similar to one another. We will focus on the WRI/WBCSD GHG Project Protocol to introduce these broad carbon accounting principles.

The WRI/WBSCD GHG Project Protocol brings together in one place the key concepts, principles, and methods to account for GHG emission reductions from any type of GHG project, e.g., wind, energy efficiency, afforestation, switching fuel sources, forest management, and carbon capture. The Project Protocol provides detailed instructions for developing a GHG emission "baseline" from which to measure project-based GHG reductions. It also explains how to account for the unintended changes in GHG emissions a project might cause and how to report GHG emission reductions for maximum transparency. It is compatible with the UN's Clean Development Mechanism (CDM), which certifies emissions reductions generated by specific projects toward targets agreed to by industrialized countries under the Kyoto Protocol.

The basic accounting steps for a GHG project under the Project Protocol are (1) identify the project activities, (2) identify the primary effects, (3) consider all secondary effects and evaluate their significance, (4) develop a baseline scenario, (5) estimate baseline emissions, (6) monitor project activity emissions, and (7) quantify GHG reductions.

A GHG project consists of a specific activity or set of activities intended to reduce GHG emissions, increase carbon storage, or enhance GHG removals from the atmosphere. Project activities may include modifications to existing processes or services or the introduction of new services that reduce GHGs, i.e., carbon, methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), bromofluorocarbons (halons), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), carbon tetrachloride, methyl chloroform, methylene chloride, chloroform, or sulfur hexafluoride.

Emissions reductions achieved through implementing a GHG project are measured against baseline emissions scenarios and are calculated by taking into account both the primary and secondary effects of a project. A primary effect is the intended change in emissions caused by a project activity. For example, installing equipment to capture methane gas emitted from a landfill has the primary effect of reducing emissions of a potent GHG. If the captured methane is then used to generate electricity, the primary effect would also include a reduction in combustion emissions from electricity generation to the extent the methane displaces higher GHG-emitting fossil-fuel-powered electric generators.

A secondary effect is the unintended change in emissions caused by a project activity. Secondary effects are sometimes referred to as "leakage." Secondary effects may be additional emissions reductions (a positive effect) or emissions increases (a negative effect). For example, if a company intends to replace its coal-based fuels with biofuels, a possible secondary effect is increased combustion emissions associated with the transportation of the biofuels (a negative effect). Secondary effects generally are small in comparison to primary effects, but they should nevertheless be evaluated before proceeding with a GHG project.

Because GHG reductions are measured against baseline emissions scenarios, developing a baseline scenario and addressing the concept of "additionality" are critical to quantifying GHG emission reductions. The baseline scenario is a hypothetical description of what would have most likely occurred in the absence of any considerations about climate change mitigation. A baseline scenario may be the continuation of current practices (the "business as usual" approach), the use of same technologies or practices used in the GHG project, or the use of alternative technologies or practices that could provide the same product or service as the GHG project activity.

The Project Protocol provides two methods for developing baseline scenarios from which to calculate baseline emissions: the project-specific procedure and the performance standard procedure. Under the project-specific procedure, a baseline scenario is developed through a structured analysis of the project activity and its alternatives. Baseline emissions are valid only for the project activity considered. The performance standard procedure estimates baseline emissions using a GHG emission rate derived from GHG emission rates of all alternative technologies and practices that could provide the same product or service as the project activity. A performance standard is sometimes referred to as a multiproject baseline because it can be used to estimate emissions for multiple project activities with common characteristics.

It is generally presumed that emissions from a GHG project activity will differ from its baseline GHG emissions scenario. However, in some cases a project activity, or the same technologies or practices it employs, may have been implemented anyway, and thus represent the baseline scenario. In these cases, the project activities are not "additional" to what otherwise would have occurred. While the concept of "additionality" seems relatively straightforward, in practice there is no precise way to determine if a project is in fact additional. A number of tests for additionality have been developed that try to isolate the reasons for implementing a GHG project, e.g., the legal and regulatory test, the financial test, and the common practice test. (Illustrations of each of these tests follow in the forest carbon sequestration discussion below.) The Project Protocol does not incorporate these additionality tests; rather, it takes the view that additionality is implicit in the procedure of developing a baseline scenario. Nevertheless, the Protocol acknowledges that there is some degree of subjectivity in developing a baseline scenario and, therefore, project developers may want to evaluate the additionality requirements imposed by specific GHG programs and those mandated by GHG legislation and regulations. In general, it should be possible to estimate a baseline GHG emission rate for the technologies or practices employed. For example, if the GHG project is to retrofit a piece of equipment to reduce GHG emissions and the baseline scenario is business as usual, baseline emissions can be estimated as the historical emission rate for the equipment that is being retrofitted.

Monitoring GHG emissions from the project activity can be achieved by directly measuring GHG emissions or by calculation methods (e.g., calculating GHG emissions from fuel consumption data). Both approaches have some degree of scientific or estimation uncertainty. Data uncertainties should be described and explained. The Protocol recommends that where uncertainties exist, project developers should use conservative estimates that will tend to underestimate GHG reductions.

The final step in GHG project accounting is to quantify GHG reductions. GHG reductions can be quantified by *ex ante* estimation or *ex post* quantification using the same basic procedures. An *ex ante* estimate involves making predictions about the project activity's performance over time. *Ex post* quantification uses actual monitoring data once the GHG project has been implemented. There are a number of formulas available to calculate GHG reductions, depending upon the type of GHG project. In general, the formulas calculate the difference in emissions under the baseline scenarios and the GHG project. However, emerging international trading rules and domestic law will probably require some form of independent postproject verification of GHG emission reductions for the credits to be tradable.

As noted above, the carbon accounting principles set forth in the WRI/WBCSD Project Protocol are found in most of the other carbon accounting standards. How the various standards apply these principles differs because the goals of the various programs differ. Thus, a single, harmonized accounting standard for carbon accounting may not be possible. Reconciling these differences remains one of the fundamental challenges of this emerging field.

Carbon Sequestration: The Forestry Model

There are two ways for a party to reduce its carbon footprint: (1) reduce its own GHG emissions, or (2) offset its GHG emissions by either acquiring emission reduction credits greater than its emissions or by sequestering (permanently removing carbon from the atmosphere) or buying sequestration credits for more carbon than it emits. In this section, we will discuss carbon sequestration through forest-related activities.

Any discussion of carbon sequestration must begin with the basics. Carbon sequestration is the process of incorporating atmospheric carbon into plants, soil, and water. Those resources or processes that absorb atmospheric carbon are commonly referred to as "carbon sinks" because of their ability to absorb, rather than emit, CO_2. Some typical practices and processes that sequester CO_2 from the atmosphere include conservation of riparian buffers; conservation tillage on croplands; grazing land management; afforestation, reforestation, forest preservation, and forest management; underground geologic suppositories; and oceanic uptake.

Carbon is sequestered in trees primarily through the natural process of photosynthesis in which plants convert CO_2 and water to glucose and oxygen. CO_2 in the atmosphere thus is incorporated as fixed carbon into the roots, trunks, branches, and leaves of trees. According to the U.S. Environmental Protection Agency (EPA), approximately 50 percent of carbon storage in trees occurs in the woody biomass. (*See* EPA, CARBON SEQUESTRATION IN AGRICULTURE AND FORESTRY: REPRESENTATIVE RATES, www.epa.gov/sequestration/rates/html). The shedding of leaves does not significantly diminish the amount of carbon stored in a tree, as only 3 percent of tree carbon is fixed in the foliage. Moreover, most of the carbon in decaying leaves will be absorbed by soil. Several factors affect how much CO_2 can be absorbed by trees, including tree size, age, and species. According to forestry experts, a mature tree can absorb up to 48 pounds of CO_2 a year. (ARGUMENTS FOR LAND CONSERVATION: DOCUMENTATION AND INFORMATION SOURCES FOR LAND RESOURCES PROTECTION, (Mike McAliney, ed., Trust for Public Land, Sacramento, California, 1993).

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Planting trees and enhancing forest management techniques will be a key strategy for many GHG emitters to reduce their carbon footprints. For some, the cost of reducing their GHG emissions will simply be cost prohibitive, and they will be forced to consider credits and offsets such as carbon sequestration projects. A recent study by the Pew Center on Global Climate Change concludes that climate change policies adopted by the United States should encourage activities that increase carbon sequestration in our forests: "Climate change is the major global environmental challenge of our time and in order to deal with it in the most cost-effective way, we need to consider the full range of solutions—and that includes carbon storage and forests." Eileen Claussen, President of the Pew Center on Global Climate Change, further notes, "If we ignore the potential for forest-based sequestration, any projection of the cost and feasibility of addressing climate change is going to be overly pessimistic and wrong."

The EPA agrees with Ms. Claussen. According to EPA estimates, growing a Douglass fir forest for a century is 25–50 percent more efficient at reducing CO_2 buildup than using an equivalent amount of land to grow biofuels. For example, if you were to grow switch grass hay to produce ethanol-based power, you will allow roughly 25–50 percent more CO_2 to remain in the atmosphere than if you had planted a fir forest on the same amount of acreage and used coal to supply that power instead. This highlights the crucial importance of forestry in the GHG reduction equation. As discussed below, however, accounting issues present a significant obstacle to the viability of forestry-based carbon sequestration.

There are numerous accounting standards for calculating the amount of carbon sequestered in forest projects, including (1) the Inter-Governmental Panel on Climate Change (IPCC) Good Practice Guidance for Land Use, Land Use Change, and Forestry (LULUCF), published in 2003; (2) the World Resources Institute (WRI) LULUCF Guidance for Greenhouse Gas Project Accounting, published in 2006; (3) DOE's Voluntary Greenhouse Gas Reporting Program, published in 2005 (56 Fed. Reg. 15,176); (4) the California Climate Registry (www.climateregistry.org); and (5) the Chicago Climate Exchange (CCX), which has published technical and reporting guidelines on forestry projects (www.chicagoclimatex.com). Parsing the differences between these programs is an exercise we would prefer to leave to economists and agronomists. For present purposes, a more useful exercise is to articulate the common principles found in most, if not all, of these standards and the issues they present.

Conceptually, to determine how much a forest-based carbon sequestration project will reduce CO_2 buildup in the atmosphere, one must begin with the identification of a credible baseline, i.e., the amount of carbon sequestered in the project area over time if the project were not undertaken. With forestry projects—whether they involve afforestation, reforestation, preventing deforestation, or forest management—one must first establish a starting point (time zero) from which changes in carbon content of the project area will be compared. Carbon content must be determined for both the vegetation on-site and the soil. This may be done using either site-specific calculations or regional average data to show how similar situations change over time. This analysis establishes a "without project" baseline that can be projected over the planned life of the project.

Next, one must determine how much carbon is actually being sequestered in the project area. The difference between the baseline and the project estimate is the additional carbon that is sequestered as a result of the project. That is not the end of the analysis, however. The product satisfies the "additionality" requirement. If other legal obligations would require the planned forestry management activities, then the project is not "additional." For example, a landowner may be required by law to plant trees on certain lands. California, which heavily regulates forest practices under its Forest Practices Act, is a prime example. These GHG-independent tree-planting obligations are central in determining whether a forest project meets the additionality requirement: if the project activities are required by law, then they do not satisfy the "additionality" criterion. Similarly, some carbon sequestration accounting standards require that an economic analysis be performed to determine if an economically rational owner of the project area would have undertaken the project without the project generating any carbon offsets credits. If the owner would have done so, then the project does not satisfy the additionality requirement.

A forestry project's secondary effects on carbon consumption, referred to as "leakage," must also be considered in evaluating the amount of carbon sequestered. Often these secondary effects are negligible by comparison to the amount of carbon sequestered as a result of project management. For example, the effect of emissions associated with the use of fertilizer in an afforestation project is a secondary effect, even though, when compared to the carbon sequestered by the project, the secondary effect may be a relatively small reduction in project carbon sequestration. On the other hand, some secondary effects of forestry projects may not be so insignificant, specifically, "activity shifting leakage." For example, if the forestry project prohibits tree harvesting in a large swath of forest, logging firms may simply shift their activities to adjacent areas outside the project zone, thus zeroing out any net carbon sequestration. By contrast, afforestation projects are unlikely to pose this leakage problem. A farmer's decision to plant trees on his or her land is unlikely to cause a forest elsewhere to be removed.

Finally, evaluation of any forest management project requires assessment of the reversibility or permanence of the project. This is one of the more vexing of the carbon accounting issues associated with valuing a forestry-based carbon sequestration project. Forests can be destroyed by fire or disease, illegal logging, or farmers, or even squatters seeking land, releasing back to the atmosphere the carbon that had been sequestered in a project area. More fundamentally, trees will eventually die, and most of the carbon sequestered in a dead tree—if left to decay—will return to the atmosphere. Even if tree carbon is converted to forest products, such as lumber used for housing or furniture, the carbon will only be stored while the lumber or furniture remains intact. Moreover, large quantities of carbon in the trunks, root system, and debris that remains after logging will decay, releasing carbon into the atmosphere. Unless dying trees are systematically replaced within a project area, the carbon offset will eventually be completely reversed. The cost of preventive measures to reduce the risk of loss and to replace trees and maintain "carbon equilibrium" within the project area in perpetuity must be factored into the cost of a project. The economics of this analysis are quite complex and have been the subject of many studies. *See, e.g.,* R. Stavins and K. Richards, *The Cost of U.S. Forest-Based Sequestration* (Pew Center on Global Climate Change, January 2005).

We are not suggesting that attorneys counseling clients on carbon sequestration projects must become experts on the economic and ecological esoterica that permeates this field. Rather, we recommend that attorneys operating in this field acquire sufficient familiarity—as they would in representing clients in any other transactional setting— with the issues to be able ask the right questions (to be capable of "issue spotting" as we used to call it in law school). Which accounting standards will apply to the project and does the project meet those standards? What happens if the forestry project is destroyed by fire or disease? Who pays to replace the trees? Is there an insurance vehicle to cover such liability? Attorneys operating in this field must be prepared to ask these types of questions and sufficiently sophisticated to be able to understand the answers. Make no mistake: there is no substitute for having expert consultants to assist. But the lawyer on such deals cannot cede all authority to consultants.