

**AFFIRMING CALIFORNIA'S FOREST OFFSET PROTOCOL:
A climate tool tailored to a purpose**

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"We have a well-tested, powerful technology to help us: the original, clean, green technology of Nature, especially forests." L.Wayburn, 2019

California now marks three decades of effort to reduce the emission of greenhouse gases. Starting with legislation in 1988 directing the California Energy Commission to prepare the state's first greenhouse gas inventory (CEC, 2019), the program now employs a suite of regulatory, incentive and market tools to reduce emissions from a wide range of sources. The state is a global leader implementing policy and testing approaches that others can build upon.

None of this has come without pushback. Vested interests and affected stakeholders have participated throughout the legislative process and regulatory rulemaking, primarily under the authority of the California Air Resources Board (CARB). Opponents have pressed litigation, a ballot initiative and legislation to stop progress, but strong political leadership, science-based arguments and public support have prevailed.

A sporadic target of opposing groups is the carbon market and the offset mechanisms it supports. Advocates for the market approach are periodically called upon to rejustify the use of pricing mechanisms and reaffirm the validity of the offsets included. This paper was stimulated by need for a strong response to recent claims that the rules for forest carbon credits, one of six compliance offset types in California's cap and trade program, result in bogus crediting (Haya, 2019; Haya and Stewart, 2019).

The specific claims of the policy brief have been responded to by CARB (2019a), the Climate Action Reserve (2019a, 2019b) and an accompanying blog (Tuttle, 2019). The inflated claims stem from overstated assumptions regarding factors in the crediting equation and inappropriate reliance on a non-analogous citation. They also fail to put into context an important provision of the crediting process.

But getting tangled in the technical weeds overlooks the fundamental justification for having a forest offset protocol at all. While misleading, the claims offer a useful teaching moment to step back and review the rationale behind California's forest offset protocol as a whole and the multiple goals it sets out to attain.

It is also helpful to have a consolidated summary on hand to quickly respond to questions when they arise. Offsets have been pejoratively characterized as dodges allowing carbon polluters to avoid reducing their emissions, or as schemes to enrich the seller for business-as-usual practices that don't help the atmosphere. In the context of California's highly developed climate program, both claims are wrong.

A retrospective look at protocol history, written through the eyes of a participant in the early days of protocol development, helps refresh understanding of protocol structure and the reasons why it is designed the way it is.

The early days California's *Compliance Offset Protocol: U.S. Forest Projects* (CARB, 2015) is the product of over 15 years of development involving many rounds of stakeholder workgroups and rulemaking hearings.

Protocol development began during the voluntary phase of climate policy in the Gov. Gray Davis administration as part of California's "yes we can" response to federal inaction. Senator Byron Sher's legislation (AB 1771) establishing the voluntary California Climate Action Registry (CCAR) in 2000 created a framework for polluters to record baseline greenhouse gas (GHG) emissions and track emission reductions. A subsequent Sher bill in 2002 (SB 812) added forests and their role as offsets, recognizing that forest loss and degradation are major sources of CO₂ emissions. This bill set the first standards for forest-based emissions reduction projects based on clear definitions of permanence, additionality and natural forest management.

The learning curve of the voluntary phase paved the way for adoption of AB 32, the *Global Warming Solutions Act of 2006*. The shift to a compliance regime triggered CARB to revise all offset standards, embedding more conservative assumptions and rigorous measurement. The forest protocol received special attention since biological systems are complicated to measure and monitor. Unlike the climate-forcing effects of ozone depleting substances and methane which stop once the chemical is destroyed, forests naturally sequester and emit carbon over time. The challenge was to establish standardized methodologies and monitoring schedules for issuing credits that accommodate a time frame relevant to forest growth and management.

Offset fundamentals The process to standardize a forest offset was started during a wild-west era of sketchy offsets sold to voluntary buyers but of dubious quality. California worked with stakeholders to develop principles and methods to quantify and verify forest-based emission reductions from three kinds of projects: "Improved Forest Management (IFM)", "Avoided Conversion" and "Reforestation".

The subject was entirely new to most and required extensive education. In the voluntary phase the fundamentals of Baseline, Additionality, Permanence, Leakage, Verification and Enforcement were developed (WRI, WBCSD 2005; 2006) and fleshed out by CCAR. The principle of "*a ton is a ton*" was adopted, meaning it didn't matter where in the world the GHG emission was generated or reduced since the atmosphere was equally impacted. The concept of "*business as usual (BAU)*", or "*Baseline*" was put in carbon terms to mean "what the atmosphere sees now under current behavior". "*Additionality*" referred to actions purposely taken beyond BAU for the benefit of the climate, either through reducing GHG emissions or increasing carbon storage (e.g. tree growth) above a BAU baseline. Under the principle of a ton is a ton, an "*offset*" was a reduction in GHG emissions that compensates for emissions made elsewhere.

Offsets were included in cap-and-trade markets as a cost-containment measure, since it could be less expensive to reduce emissions at another type of facility or sector. Cost containment was important to policy makers concerned with introducing a new carbon pricing mechanism and needing to temper its economic impact. Further, offsets allowed tapping into emission sectors that were difficult to otherwise regulate, and lower costs meant more emission reductions could be attained.

From the beginning however, offset use has been limited in favor of direct emission reductions. In cap-and-trade, regulated entities must submit a "permit to pollute" (in the form of allowances or offsets) for every ton of GHG emitted. The primary lever driving emission reductions is the increasing price and declining supply of allowances. Offsets serve as a junior compliance companion, giving emitters some

cost-containment flexibility and allowing sectors outside the cap to participate. The limit on offset use from 2012 to 2020 was 8% of the emitter's triennial compliance obligation, with allowances required for the rest. Legislation extending the cap-and-trade market to 2030 (AB 398) lowered allowable offset use to 4% from 2021 to 2025, and 6% for 2026 to 2030. A requirement was also added that half the offsets must be sourced from projects that provide direct environmental benefits to California.

Incentivizing forest co-benefits While capturing the climate mitigation capacity of forests was paramount, a parallel motivator was to conserve forests for the many other environmental services they provide. The economics of keeping privately-owned forestlands as forests is always being weighed against more lucrative land use alternatives as subdivision and development. The creeping parcelization of forest land around rural and suburban hubs has resulted in the WUI, or wildland-urban interface, which is now the focus of wildfire risk and loss of lives and homes. If the sale of carbon credits could help a landowner invest in improving forest productivity, then the temptation to develop might be deferred and thereby allow other forest benefits, e.g. continued sequestration, wildlife habitat, watershed functions, wood products and beauty, to be retained as well.

It was thus important that the protocols be practical in application to attract landowners to participate at all. The audience was limited, the concepts foreign, the commitments to participate substantial, the risks novel and the up-front costs high.

To cap forest emissions or not? Most analysts recognized that forests were unlikely to be placed under a market cap with each landowner treated as covered entity. GHG emissions from smokestacks and other point-sources are relatively straightforward to regulate, and ownership of the emission can be tracked to a specific entity (e.g. utility, refinery). But it would be a bookkeeping nightmare to enforce a compliance obligation on each of the thousands of privately-owned forest parcels, each with its own management history, baseline emission and sequestration gain. So from the beginning, emissions from agriculture and forests have been considered as lying "outside the cap", and serve instead as potential sources of offsets through carefully crafted projects.

Incentivizing carbon gains So if caps were unwieldy, how could forests be included in a climate program, and how could landowners be incentivized to voluntarily increase carbon storage where it made sense?

Historically, a significant portion of California's private forest lands have been heavily harvested, meaning that carbon stock has been reduced, in non-technical terms, "below the forest's natural holding capacity". For example, redwood and ponderosa pine stands on some private lands historically held, on average, more than 10 times more carbon than their current stocks. No incentive was in place to assist landowners in rebuilding those stocks, and many acres languished in depleted, understocked conditions. The "Improved Forest Management" offset protocol offered landowners the opportunity to rebuild carbon stocks by managing for higher productivity, growing bigger trees and on longer rotations. The forest could still be periodically harvested, but at lower intensity. Over time, as carbon accrued in larger trees, wood product production might even increase while still retaining carbon stock at levels higher than the start of the project. Hence the importance of a long time horizon in project evaluation.

Permanence Permanence of the offset was the most debated criteria of all. In the early days of the voluntary market the Chicago Climate Exchange had created a 5-year permanence standard for one of its tradable offerings, which was ludicrous. A ton of CO₂ emitted to the atmosphere may take hundreds of years or more to recycle to an ocean or terrestrial sink, so an offset for an emitted ton would need to

sequester carbon for an equivalent time. The IPCC used 100-years to define the global warming potential of greenhouse gases (IPCC, 2001) and this was adopted by policy makers as a tractable period for an offset mechanism. Despite pressure from some interest groups to shorten the commitment, the 100-year permanence standard has prevailed, in part to prevent crediting for business-as-usual forest rotations that do not result in additionality. Landowners must demonstrate their additional tons are accruing through a prescribed schedule of monitoring, reporting and third-party verification through the life of the project. Even a credit issued in the 100th year must be monitored for another 100 years.

Risk Insurance Protocol developers were not naïve in recognizing the challenge of projecting forest management over such a long time period. Forests are subject to risks of wildfire, drought, pests, and changes in landowner intent. To cover carbon credits against unintended reversals (i.e., emissions caused by tree mortality from fire, drought and pests), the protocol requires that a percentage of credits be deducted off the top and deposited into a CARB forest buffer account that serves as an insurance pool to “keep the atmosphere whole” in the event of unintended emissions. The size of the deduction includes risk factors for financial, management, social and natural disturbances.

Landowners may also decide to terminate their carbon project intentionally, but at a cost. If terminated, allowances or offsets must immediately be surrendered to backfill all credits at a ratio based on project age. For projects 50 years old or more, compensation is 1 allowance per credit. For projects 5 years or less, the ratio is 1.4 allowances per credit. Assuming the price of allowances has risen as the cap tightens, the cost for replacement tons will likely be higher than the owner received when the offset was first sold.

In the worst case, should a forest carbon credit be invalidated for some reason, then the *buyer* of the credit is liable and must replace it.

What about carbon in wood products? Carbon stored in the lumber of long-lived buildings is a legitimate storage pool and the protocols account for it. There is always more carbon in forests than lumber since carbon loss occurs at each step between the harvest of the whole tree, processing in the mill, incorporation in a building, and eventual combustion or decay. Protocol developers modified an international concept (UNFCCC, 2008) to provide that the transfer of net carbon to wood products is not counted as an emission while the wood is still in use.

Some critics deride the concept of increasing standing carbon in the forest, preferring shorter rather than longer rotations in order to move more carbon into the wood products pool faster and get new trees in the ground. This is a life-cycle assessment debate between the growth of plantation-grown young trees versus higher carbon storage in larger, older trees. Some landowners prefer the benefits that come with well-spaced, bigger trees (important as one factor in wildfire resistance, e.g. Bennett and Fitzgerald, 2010), and the biodiversity and watershed processes associated with complex forest structure. The protocols require natural forest management and set limits on clearcutting, but regardless of management style the basic test of offset crediting remains the same: demonstration of carbon stock additionality above a baseline.

The BAU baseline The definition of the baseline against which additionality is measured was significantly changed between the voluntary and compliance stages of offset design (CAR, 2019b). Setting a baseline involved issues of carbon stock currently on site, the intensity of harvest that the landowner could legally conduct under forest practice rules and other constraints, and presumptions about “landowner intent” in how aggressively they might actually harvest in the future. This required

discretionary decision-making and counter-factual assumptions for each project when approving its baseline.

The solution for avoiding discretionary decisions was to establish a “common practice” baseline that all projects within a geographic region would use. Delineation of assessment area is based on drivers that influence forest carbon stocks, including common forest vegetation, common jurisdictional and regulatory influences, and common economic influences. Average carbon stock within assessment areas is derived from the long-term Forest Inventory and Analysis (FIA) data of the USDA Forest Service (USDA, 2019) and used as input in baseline calculations.

Further discussion of the mechanics of IFM projects can be found on the Climate Action Reserve website (CAR, 2019c). It is recommended that those interested in protocol detail refer to the full regulatory text adopted by CARB (2015) and to revisions proposed for Version 5.0 of the Forest Protocol by the Climate Action Reserve (CAR, 2019d).

Leakage and alleged “greenhouse gas debt” The Haya policy brief criticizes two aspects of the Forest Protocols: the amount and timing of the deduction for leakage over the 100-year life of a project, and an alleged “greenhouse gas debt” triggered at the beginning of some carbon projects. Neither of these are new subjects and both received extensive consideration during protocol development. Both warrant further explanation.

Leakage Leakage refers to harvesting that moves elsewhere as a result of implementing a carbon project. For example, if harvest is deferred on a project in favor of increasing carbon storage, then someone else may increase their harvest to backfill the unmet market demand for wood products. This cancels out a portion of the carbon gains booked to the project. Therefore a deduction is taken off the top to account for leakage before credits are issued.

Leakage appears in two sections of the crediting equation. The general protocol assumption is that for every 1 ton of reduced harvesting caused by a Forest Project, the market will compensate with an increase in harvesting of 0.2 ton on other lands. This 20% deduction is found in the “Secondary Effects” equation, 5.10, which is applied each year to the difference in harvest volume between actual harvesting on the project and the harvest baseline under BAU. The deduction is applied to all carbon in the harvested trees (including standing, dead and unmerchantable trees, belowground biomass and bark).

A second leakage adjustment appears as a 0.80 multiplier in Equation 5.1. This applies only to carbon in the wood products themselves (e.g. soft- and hardwood lumber, plywood), calculated per Appendix C. Although not clear from the explanatory text, this factor was included to avoid double penalizing harvested wood products (HWP) that *are* produced from a project. That is, this avoids charging a second leakage deduction for the wood products on top of the 20% leakage already charged to the project.

Further text clarification by administrators of the compliance protocol would be helpful. Additionally, it should be noted that the leakage deduction applies in only one direction against a project. Using the same logic, if a project eventually *increases* HWP production in response to growing bigger trees, we should assume someone else in the market has concomitantly *decreased* their production. It can be argued the leakage deduction should also be adjustable downwards, but this is not currently provided in credit calculation.

The inappropriate citation Haya contends the 20% leakage factor is too low and makes an extravagant claim that “...82% of (forest offset) credits likely do not represent true emissions reductions due to the protocol’s use of lenient leakage accounting methods.” This is based on extreme reading of a literature citation which both its author and CARB emphasize is inappropriate (Murray, 2019). The citation refers to a non-analogous example regarding leakage following a complete shutdown of logging caused by federal policy change in the Pacific Northwest. However, the very premise of an “Improved Forest Management” project is that harvesting *will* occur periodically throughout the 100-year project life. Murray strongly disputes the use of his research to support Haya’s claims, noting that timber flow is not the same as carbon flow, and that land use change and project location cause the size of a leakage deduction to be highly variable.

First-year crediting and alleged “greenhouse gas debt” A separate claim regarding an alleged “greenhouse gas debt” also needs further discussion. It goes to the heart of an important decision that was made to incentivize the retention of forest stands that already support high carbon stocking.

As noted, large acreages of California’s private forestlands have been heavily harvested, and few incentives have been in place to assist landowners in rebuilding those stocks. The “Improved Forest Management” offset protocol offered landowners the opportunity to rebuild carbon stocks by managing for higher productivity, growing bigger trees and on longer rotations.

But in limited instances, some forests still retain a relatively high level of carbon stocking. This indicates that the landowner has historically undertaken low-intensity harvest in spite of prevailing economic advantages to harvest more. The result is an unusually carbon-rich forest compared to average stocks in the surrounding region. The decision was made that in these rare but ecologically important properties, initial year credits were permitted to be issued. *Not* crediting these carbon sinks would create an incentive for aggressive harvest prior to initiating a project, with resulting emissions and many years needed to restore those formerly stored stocks back to their prior level, much less build more.

With respect to leakage from these high carbon sites, in one sense the market has already adjusted to, and reflects, the historically lower contribution of wood products from those sites. The so-called “leakage” has already occurred, so does it need to be charged again? This notion would need further discussion, but in any event, forest management is generally evaluated over a time span relevant to tree growth and harvest cycles, rather than point-in-time snapshots. Leakage and additionality must be assessed in light of the 100-year time frame of a project, not just the moment of project initiation, which the policy brief fails to do.

The challenge to protocol designers was to develop a standardized approach that anticipates future events but can’t know exactly when they will occur, such as increased harvest in response to market upticks, or to pay down debt. Rather than adopting a see-saw approach that issues credits and then charges reversals as each event occurs, it was decided to adopt an averaging approach that is based on comparison between modeled growth and actual on-site carbon stock and wood product production. After project initiation, harvest volume and leakage deductions are reported every year. Recall that no credits are issued in advance of detailed, ground-based site inventory, baseline quantification, comparison to starting carbon stocks, and independent third-party verification.

Timing of forest climate benefits The associated claim that forest carbon projects do not provide instant climate benefits appears to lack understanding of forest management. The timing of forest contributions to climate mitigation cannot be expected to be the same as the instant gains from

destruction of methane or ozone depleting substances. If we want to incorporate forests into the suite of climate solutions at all, we need to recognize and accommodate the jagged line of forest growth and emissions over time, and judge success by the upward trend of additional carbon stocking that accrues over the life of the project.

It is noted that the literature on leakage rates is limited and a new look at leakage factors may be appropriate. The Climate Action Reserve has a revised Version 5.0 of the protocols in the public comment process, and the “Offsets Compliance Task Force” pursuant to AB 398 offers another opportunity for discussion.

In sum, the agency rebuttals to the claims find that the protocol’s conservative leakage accounting does not have a major impact on crediting, and an alleged “greenhouse debt” from initial crediting of carbon-rich forests does not occur. Further, the construct of an initial “debt” is not an appropriate lens for evaluating climate contributions from forests. The claims of extensive bogus crediting are highly exaggerated, rest upon an inappropriate citation, and should be viewed with a high degree of skepticism.

Environmental Justice The health effects of air pollution are serious, and communities located close to pollution sources are disproportionately impacted. Kaswan (2018) offers an informative overview of environmental justice concerns with climate programs and actions taken in response.

Carbon dioxide, the greenhouse gas most relevant to forests, does not cause the same impact to lungs and cardiovascular health as the criteria air pollutants spewed by nearby refineries, factories and transportation corridors. But, the concern that any offset mechanism might enable the continued operation of a polluting facility has been taken seriously by the legislature and CARB decision makers. SB 535 (deLeon) directs that 25% of the Greenhouse Gas Reduction Fund (GGRF), generated by the auction of allowances, be invested in disadvantaged communities. Additionally, new attention to enforcement of criteria pollutants, increased access to zero-emission vehicles and trucks, and reductions in offset use post-2020 are underway.

It needs to be noted though that the post-2020 reduction in allowed offset use, taken together with requirements limiting projects outside California, will raise barriers for landowners to participate and likely put a chill on forest projects. This may be tempered by possible rise in offset price linked to a tighter cap over time, but this remains to be seen.

Forests beyond offsets Beyond markets, climate contributions from forests can be tapped through other approaches as well. While most focus to date has been on emission reductions from electricity and transportation sectors, the California 2030 and 2050 goals mean we must direct accelerated efforts to forests and landscapes. Forest accounting at the whole-sector level now receives revived attention to better quantify the role of natural and working landscapes in the overall state emissions budget. The *Natural and Working Lands (NWL) Inventory* (CARB, 2018a) provides a quantitative estimate of ecosystem carbon stored in the State’s land base including forests, soil, crop land, urban forests and wetlands. The NWL inventory continues to be refined as better data becomes available and as major emission events, e.g. wildfire and fuel reduction treatments, occur.

Examples of on-the-ground measures are offered in the “*Forest Carbon Plan*” (CARB, 2018b) and the “*Natural and Working Lands Climate Change Implementation Plan*” (California State Agencies, 2018). Wildland fuel treatments, soil carbon enhancements, forest restoration, working land conservation

easements and other project types can variously apply for state support through the “California Climate Investments” program, generated from the sale of cap-and-trade allowances (California State Agencies, 2019b), and from bond funds. The NWL inventory tracks implementation of climate investments in the land base and contributions to state climate goals.

“Climate Forward” A new concept has also been launched by the Climate Action Reserve to accelerate immediate climate action. By registering ex-ante emission reductions, i.e. reductions made in anticipation of emissions that will occur later, a wide array of pro-active GHG mitigation projects can be approved and implemented ahead of time through standardized quantification methodologies (CAR, 2019e). The credits can later be surrendered by companies and organizations as mitigation for emissions from future projects.

The program was initially developed under a pilot phase for an entity looking to fulfill its GHG mitigation obligations under the California Environmental Quality Act (CEQA, 2018) in a way other than purchasing offsets. The pilot includes a project methodology based on securing forests with a conservation easement that requires management to guide growth towards conditions optimal for carbon and wood product production (i.e. culmination of mean annual increment). Also in preparation is a reforestation methodology separate from the offset compliance program, for which there is tremendous interest.

In sum Protocol developers have worked hard to include the contributions of forests in California’s ambitious search for climate solutions from all sectors. Dealing with forests means thinking on a time scale relevant to tree growth and management, recognizing both natural and management-driven carbon flux, and incentivizing landowners to participate despite high hurdles to entry. The net result here is a very conservative crediting methodology based on scientifically justified judgments and rigorously scrutinized ground-based data.

Already the up-front costs of carbon project design, timber inventory and initial verification can reach well over \$100,000, plus the ongoing costs for monitoring and reporting over the 100-year life of the project. Deductions of credits off the top for buffer pool and leakage, reductions for measurement uncertainty, conservative calculations for wood products and wood in landfills, strict inventory standards, the 100-year permanence requirement and other transaction costs are strong barriers to participation.

The mechanisms behind cap-and-trade and offsets are complex and involve many cogs and levers. It is understandable they may be misinterpreted. Unfortunately, the forest offset program has attracted often misinformed criticism and attempts to hobble its contributions towards addressing the enormity of climate change. Regulatory changes do need to be considered when justified, and opportunities to consider modifying and expanding the offset program are available.

Forest carbon offsets have already secured large acreages of forest carbon stocks and valuable co-benefits in many states, using a market approach that puts a price on their value. It is hoped that better understanding of forest offset standards will help temper future unwarranted attacks, and encourage forest owners to provide more real, additional and rigorously quantified forest offsets. The enormity of the climate challenge demands that forests be recognized for their important role in the ‘all-hands-on-deck’ effort.

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