



FOREST CARBON

IN CALIFORNIA'S CAP AND TRADE PROGRAM

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BENEFITS


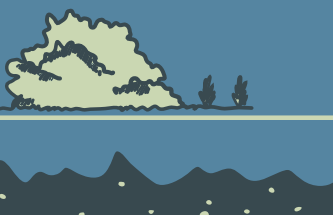
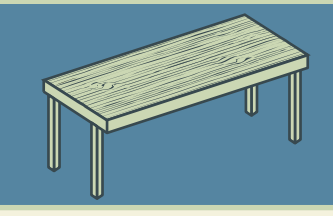
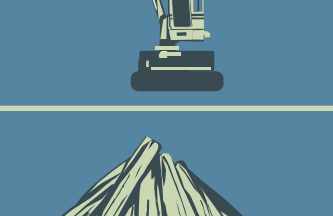


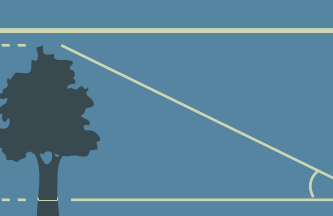
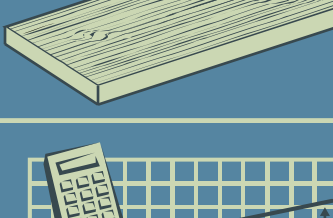


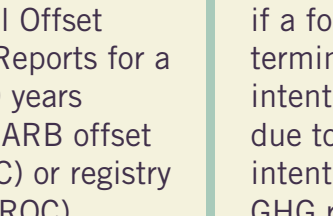
IMPORTANT SAFEGUARDS

CARBON QUANTIFICATION

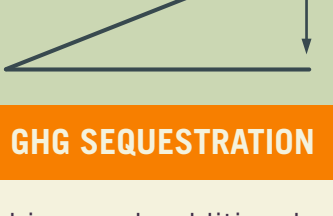






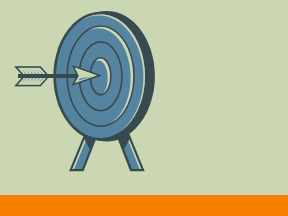
PROJECT ACTIVITIES

Trees, soils, and understory plants in forests naturally absorb carbon dioxide (CO₂) from the atmosphere and store the gas as carbon. Through sustainable management and protection, avoided conversion of forests to other uses, and reforestation, forests can increase their carbon storage compared to a business-as-usual scenario. The California Air Resources Board (ARB) adopted the U.S. Forests Compliance Offset Protocol for use in its cap-and-trade program to support the increased sequestration of carbon in forests. The protocol provides offset project eligibility rules, methods to calculate net effects on GHG emissions and removals, procedures to assess the risk that carbon sequestered by a project may be reversed, and approaches for long-term project monitoring and reporting. Offsets earned under this protocol may be used as compliance instruments.

PROJECT ACTIVITIES		
		
REFORESTATION	IMPROVED FOREST MANAGEMENT	AVOIDED CONVERSION
Restore tree cover on land that is not at optimal stocking levels through tree planting or removal of impediments to natural reforestation. Forest must have had less than 10 percent canopy cover for at least 10 years or experienced a significant natural disturbance that removed at least 20 percent of the trees.	Increase carbon stocks on forested land relative to baseline levels of carbon stocks through activities such as increasing rotation ages to increase the overall age of the forest, increasing the stocking of trees on understocked areas, and increasing forest productivity by thinning diseased and suppressed trees.	Prevent the conversion of forestland under significant threat of conversion to non-forest land use by dedicating the land to continuous forest cover through a conservation easement or transfer to public ownership.

CARBON QUANTIFICATION	
WHAT GETS MEASURED	
SINKS, RESERVOIRS AND POOLS	 Standing live and dead carbon (carbon in all portions of living and dead standing trees)
	 Shrubs and herbaceous understory carbon (in Reforestation projects only)
	 Soil carbon
	 Carbon in harvested wood products
SOURCES	 Biological and mobile combustion emissions from site preparation activities
	 Biological emissions from clearing of forestland or changes in harvesting outside the project area
	 Biological emissions from decomposition of forest products
KEY FACTORS FOR QUANTIFICATION	
BASELINE	 Estimate baseline onsite carbon stocks and carbon in harvested wood products by modeling what would have occurred in the absence of a forest project over 100 years
EQUATIONS	<p>eg BIOPAK EQUATION 889</p> $BLB = 13.0 + 12.4 \times \left[\frac{DBH^2}{100} \right] \times HT$ Use volume estimation and biomass equations developed by the U.S. Forest Service Forest Inventory and Analysis (FIA) National Program for the appropriate U.S. state and tree species to calculate total biomass and convert biomass to tons of carbon dioxide
MEASURE	 The main inputs into the tree species equations include diameter at breast height (DBH) and height of the tree
QUANTIFY	 Estimate carbon stored in wood products using wood density factors, wood product classes (e.g. paper, hardwood lumber, plywood), and regional mill efficiency data (default factors conveying the percentage of wood that is turned into product in a region)
QUANTIFY	 Quantify the actual change in carbon stocks to determine the net carbon reduction associated with the forest project

IMPORTANT SAFEGUARDS			
ENSURING PERMANENCE	 100 YEARS OF MONITORING	 ENFORCEMENT	 CONSERVATION EASEMENT
	Forest projects must continue to monitor onsite carbon stocks and submit annual Offset Project Data Reports for a period of 100 years following any ARB offset credit (ARBOC) or registry offset credit (ROC) issuance.	ARB requires forest owners to replace any previously issued ARBOCs if a forest project is terminated due to an intentional reversal (e.g. due to harvesting). All intentional reversals of GHG reductions must be compensated for through the retirement of compliance instruments.	Avoided conversion projects on private land must record a qualified conservation easement that is perpetual in duration in order to be eligible. IFM and Reforestation projects that record a qualified conservation easement may reduce its risk rating and required contribution to the Forest Buffer Account.
	 BUFFER ACCOUNT		All forest projects contribute a percentage of ARBOCs to the Forest Buffer Account. The contribution percentage is determined by a project-specific risk rating. If a project experiences an unintentional reversal (e.g. fire or disease), ARBOCs from the Forest Buffer Account are retired in an amount equal to the total amount of carbon that was reversed.
ENVIRONMENTAL SAFEGUARDS	 REGULATORY COMPLIANCE	 SUSTAINABLE HARVESTING	 NATURAL FOREST MANAGEMENT
	Project lands must meet all applicable local, regional and national requirements that apply. If a verifier finds that an offset project is in a state of non-compliance with any environmental law or regulation, then ARBOCs or ROCs will not be issued for GHG reductions that occurred during the reporting period of non-compliance.	If harvesting occurs, the project must employ sustainable long-term harvesting. The forest owner may comply by being certified under the Forest Stewardship Council or other sustainable harvest certification program; adhering to a renewable long-term management plan that is sanctioned and monitored by a state or federal agency; or employing uneven-aged silvicultural practices and maintaining canopy cover averaging at least 40 percent across the forestland owned by the forest owner in the same assessment areas.	All forest projects must promote and maintain native forests comprised of a diversity of native species, multiple ages, and at multiple landscape scales. Native forests are defined as those forests occurring naturally in an area, as neither a direct nor indirect consequence of human activity post-dating European settlement.
CHECKS AND BALANCES	 PROFESSIONAL FORESTER	 ARB-ACCREDITED VERIFICATION	 TRANSPARENCY
	All reports that reference carbon stocks must be submitted with the oversight of a Professional Forester. A Professional Forester is an individual engaged in the science and profession of forestry with credentials under professional forester licensing laws and regulations. Where a jurisdiction does not have a professional forester law or regulation, the individual must have Certified Forester credentials managed by the Society of American Foresters or other valid credential approved by a government agency.	ARB requires the third-party verification of all GHG emission reductions or removal enhancements before any ARB offset credits are issued. Only ARB-accredited offset verification bodies and offset verifiers may provide verification services under the Compliance Offset Program. Each verification team must include at least one Professional Forester, one individual with demonstrated competence in forest biometrics, and one individual with demonstrated competence with forest growth and yield models.	The program supports data transparency for all Forest Projects, including data that displays current carbon stocks, reversals, and verified GHG reductions and removals. All non-confidential project data is publicly available on the Offset Project Registry website, such as the Climate Action Reserve's website.

BENEFITS			
 GHG SEQUESTRATION	 REVENUE	 HABITAT	 WILDLIFE
Achieve real, additional, and permanent increases in carbon storage than would have been gained in a business-as-usual scenario	Generate a new income stream based on forest stewardship	Restore fragile habitats diminished by aggressive harvesting and encroaching development, improve forest structure, and increase natural diversity	Provide protection for rare and threatened plants and animals, and serve as a seasonal haven for migratory birds
 WATER QUALITY	 AIR QUALITY	 RECREATION	 SUPPORT REDUCTION GOALS
Reduce flooding, erosion, and sediment delivery to streams and waterways	Improve air quality for neighboring communities	Provide enhanced recreational opportunities including hiking, wildlife viewing, and camping	Support efforts of businesses and organizations to meet emissions reduction goals

LEARN MORE

- California Air Resources Board Compliance Offset Protocol U.S. Forest Projects
<http://www.arb.ca.gov/cc/capandtrade/protocols/usforestprojects.htm>
- ARB U.S. Forest Offset Protocol Frequently Asked Questions
http://www.arb.ca.gov/cc/capandtrade/protocols/usforest/resources/faq_102913_post.pdf
- Climate Action Reserve Forest Project Protocol
<http://www.climateactionreserve.org/how/protocols/forest/>
- Climate Action Reserve on the California Compliance Offset Program
<http://www.climateactionreserve.org/how/california-compliance-projects/>

