

Carbon Market Basics

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The development of carbon markets in the agricultural and forestry sectors has gained interest from both carbon credit buyers and sellers. A few of the most common questions occur at the core foundation of carbon markets themselves include: what is a carbon market? A carbon credit? Why do these markets exist? This publication outlines some basic concepts, definitions, and characteristics of carbon markets and carbon credits.

WHAT IS A CARBON MARKET?

A carbon market is a platform where carbon credits are bought and sold. These markets allow individuals and companies to offset their greenhouse gas (GHG) emissions by purchasing credits from organizations or nature-based projects (e.g., preventing deforestation or carbon sequestered from farmers adopting cover crop practices) that remove or reduce such emissions. Each carbon credit equals one metric ton of carbon dioxide or the equivalent amount of other greenhouse gases (methane, nitrous oxide, and fluorinated gases) that have been avoided, reduced, or sequestered. Once an individual or company uses a carbon credit to decrease emissions, it becomes an offset. That credit is then "retired," essentially taking it out of circulation for further use.

WHY DO CARBON MARKETS EXIST?

The global foundation of carbon programs began with the 2015 Paris Agreement. The Paris Agreement is a legally binding international treaty on climate change and was adopted by over 200 countries. The goal of the Agreement is to limit the increase in global average temperature to below two degrees Celsius compared to pre-industrial levels. Since each country's emissions of greenhouse gases differ (e.g., the U.S. contributes 15% of global carbon dioxide emissions, while Japan contributes 4%), each country sets emission-reduction targets, known as National Determined Contributions (NDCs).

Two types of carbon markets have developed to reduce greenhouse gas emissions and meet the goals of The Paris Agreement: compliance markets and voluntary markets. In compliance markets, the federal or state government imposes limits on greenhouse gas. Compliance-based markets are the most popular carbon market strategy globally. However, U.S. carbon programs are driven largely by voluntary markets. Voluntary markets arose due to companies voluntarily committing to reduce their greenhouse gas emissions. Examples can be found in numerous popular press articles covering a company's pledges to have net-zero greenhouse gas emissions by a future date. So why are companies voluntarily making these pledges, which inherently will increase costs for the company? Some of these companies are driven by their mission and business goals, where environmental stewardship plays an important role. Other companies are driven by consumers and investors that demand environmental accountability. A company communicates its environmental pledges and actions through

sustainability reports, also known as Environmental, Social, and Governance (ESG) reporting.

Given the demand for environmental stewardship, companies are voluntarily pledging to reduce their carbon emissions. While some companies may reach this goal internally by improving operating efficiencies, converting to green energy, and regulating their supply chain, many companies need to purchase carbon credits from other sources to fully offset their emissions.

WHAT IS A CARBON CREDIT?

As mentioned above, a carbon credit equals one metric ton of carbon dioxide or the equivalent amount of other greenhouse gases (methane, nitrous oxide, and fluorinated gases) that have been avoided, reduced, or sequestered. In the agricultural and forestry sectors, there are various ways to generate carbon credits. However, the amount of carbon credits generated by each activity will vary by a host of different factors. Activities that qualify to generate carbon credits will differ by contract and are defined in the contractual arrangement between the landowner and the carbon company offering payment. Current carbon programs which target row crop production pay producers for generating carbon credits through the adoption of management practices which meet specific beneficial ecosystem criteria. The most common practices include no-till/reduced-till, cover crops, crop rotation, and buffer strips that sequester carbon. Carbon programs targeting livestock production, specifically beef operations, pay for the adoption of regenerative grazing practices. Forestry-based carbon programs pay landowners to defer harvest or to actively manage their woodlands to increase the forest's potential to capture and store carbon. Farmers, ranchers, and woodland owners are typically paid based on the amount of carbon sequestered, either on a per-acre basis or per metric ton of carbon sequestered.

KEY CHARACTERISTICS OF A CARBON CREDIT

Not all carbon credits are created equal. Key characteristics exist to ensure that a carbon credit is a "quality" credit. These characteristics include additionality, verification, permanence, leakage, and exclusivity. The higher the quality, the more valuable the carbon credit. Each characteristic is discussed further below.

Additionality – Assures that the practices adopted to sequester carbon and generate carbon credits would not have occurred without the incentives provided by the carbon program or company. Farmers, ranchers, or woodland owners must adopt a new practice that sequesters additional carbon, and this new practice must be different from a "business as usual" approach. The concept of additionality is a contested debate in agricultural and forestry carbon markets. The contention comes from farmers, ranchers, and woodland owners who have already adopted management practices that sequester carbon. For example, if a row-crop farmer has been implementing no-till production practices for 20 years, they are not eligible to enroll in most carbon programs that pay for adopting no-till practices.

Verification – A carbon credit is typically verified by a third-party process to ensure the credit is "real." The process of generating the carbon credit must adhere to the contractual arrangement, and the methodology for measuring the amount of carbon sequestered must meet the standard established by registries, which are entities that track, assign ownership, and retire carbon credits. Example registries include Verra, Climate Action Reserve,

Gold Standard, and American Carbon Registry. A resource illustrating how verification differs by carbon company can be found [here](#).

Permanence – A key factor in determining a high-quality carbon credit is the length of time that carbon dioxide (or other GHG emissions) is removed from the atmosphere and sequestered in the soil or tree. While the ambition is to permanently remove GHG emissions from the atmosphere, this is difficult in the agricultural and forestry sectors. Agriculturally related sectors run the risk of releasing sequestered GHGs back into the atmosphere through climate variability and management practices. For example, an outbreak of herbicide-resistant weeds could require tillage which would release sequestered carbon from the soil. Some carbon programs ease this requirement by requiring a finite term for implementing carbon sequestering practices. Similarly, forest perturbations such as wildfires or pests and pathogens may necessitate the need for management to maintain forest health and function. Each program addresses these circumstances and allowable management activities differently.

Leakage – This occurs when carbon credits are generated to simply displace the GHG emissions of the individual or company buying and retiring the credit. Another way leakage occurs is if generating a carbon credit accidentally increases GHG emissions elsewhere. For example, if a forest was saved from harvest in one location (which generated carbon credits) to offset the harvesting of a forest in another area.

Exclusivity – A carbon credit cannot be owned or retired by multiple entities. Once a farmer, rancher, or woodland owner generates a carbon credit and then sells that carbon credit, it no longer belongs to them. Tracking ownership of a carbon credit is essential to avoid double-counting and ensures that two companies cannot offset their carbon emissions with the same credit.

EXAMPLE USE OF A CARBON CREDIT

An airline company pledges to have net-zero GHG emissions by 2030. This pledge is driven by consumer demands requiring more sustainable options for travel. The airline company decides to convert to sustainable aviation fuel and offset all other emissions with carbon credits to meet this goal. The airline company purchases credits from a carbon program that paid landowners not to harvest 250,000 acres of woodlands in the Southeastern U.S. These credits were verified by a third party and followed the standards of one of the registries (e.g., Verra). The company then uses or retires those credits to offset its remaining GHG emissions to meet its net-zero pledge by 2030.

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