Understanding Voluntary Carbon Markets

KEY CONSIDERATIONS FOR PROFESSIONAL ACCOUNTANTS AND PURCHASERS ON THE CARBON CREDIT LIFE CYCLE

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Introduction

As demands for credible climate action rise, many organizations are committing to reduce their greenhouse gas (GHG) emissions, and may look to carbon credits within voluntary carbon markets (VCMs) for hard to abate GHG emissions. Despite the emergence of good practices and carbon crediting programs intended to promote confidence in the market, many quality and integrity concerns remain. There also appears to be a general lack of understanding about how the VCMs function and how to critically assess the quality of a carbon credit.

We believe that purchasers and other market participants can benefit from guidance in applying due diligence to decisions regarding the VCMs. This informative series will help professional accountants, investors, regulators and policymakers enhance their understanding of carbon markets as a potentially important part of the infrastructure needed to support a sustainable transition.

This series is a collaboration between Chartered Professional Accountants of Canada (CPA Canada), the International Federation of Accountants (IFAC) and the Institute for Sustainable Finance (ISF). This first report provides a general overview of VCMs, the process for generating a carbon credit within a VCM and considerations for purchasing carbon credits, including key attributes that may contribute to the quality of a credit. Future instalments will dive deeper into the use of carbon credits internationally, the accounting, verification and disclosure requirements, and will explore the roles of professional accountants in enhancing the integrity of VCMs. Further, we aim to identify key opportunities to foster trust, bolster transparency and strengthen accountability as VCMs continue to expand in Canada, and around the world.

This report was based on desktop research; information from voluntary offset project registries, associated organizations and publicly available data.

Compared to other established marketplaces, VCMs are in their infancy, and as a result, we can expect the policies, regulations and other market forces related to VCMs to evolve over time as the market matures. See **here** where we discuss important recent developments on the topic of VCMs from the United Nations Conference of the Parties on Climate Change (COP28) and the International Organization of Securities Commissions (IOSCO). This report reflects our current understanding based on a high-level review of information publicly available as of the date of publication, and readers are encouraged to keep abreast of this ever-changing marketplace.

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What are carbon markets and credits and why do they exist?

Simply put, carbon markets are a type of financial market where buyers and sellers trade carbon credits.

Carbon credits are essentially financial instruments that can be traded. Each carbon credit represents one tonne of carbon dioxide or its equivalent (CO_2e) that is removed, avoided or reduced from the atmosphere. These credits can then be bought and sold on markets. The purchaser of a carbon credit typically uses them to *offset* their own emissions related to GHG emissions reduction targets or commitments.

Terminology: Carbon offset vs. carbon credit

The terms carbon credit, carbon offset and carbon offset credit are often used interchangeably without obvious consensus on different meanings. Throughout this report, the term *carbon credit* is used in the context of a transferable instrument that results from an offset that can be traded in a marketplace, and *offset* is used to mean the removal, avoidance or reduction of one tonne of CO_2e from the atmosphere.

There are other mechanisms and credits in the marketplace used to offset climate or nature impacts, such as renewable energy certificates. Biodiversity credits are also growing in prominence since the adoption of the Kunming-Montreal Global Biodiversity Framework during COP 15 in 2022. *This report is solely focused on carbon credits generated in VCMs*.

Origin of carbon markets

The carbon markets were born as a result of the need for climate change mitigation efforts and strategies arising from international commitments to climate action, both regulatory and voluntary in nature. Many companies face increasing expectations from customers, investors, lenders, insurers and policy makers to take action to reduce their GHG emissions.

The Paris Agreement, ratified in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC), is an international treaty aimed at reducing total global carbon emissions to help mitigate the impacts of climate change, which catapulted the demand for credible climate action across the globe. Its primary goal is to limit the global temperature increase to well below two degrees Celsius above pre-industrial levels, with the ambition to limit the increase to only 1.5 degrees Celsius. The agreement encourages countries to submit and periodically update Nationally Determined Contributions (NDCs) outlining their climate action plans. It emphasizes a collective effort, financial support for developing nations, and a commitment to enhance climate resilience and adaptability. The Paris Agreement represents a cooperative and comprehensive framework to mitigate climate change impacts and transition towards a more sustainable, low-carbon future.

Compliance vs. voluntary carbon markets

There are two types of carbon markets – compliance and voluntary. This report focuses on the voluntary carbon markets, or **VCMs**, which are fundamentally different from compliance markets in their main purpose, nature of tradable units, overarching frameworks, issuers and market participants.

Generally, the type of market depends on whether the tradeable units are used to meet voluntary or regulatory emissions limits or targets.

Compliance carbon markets, commonly referred to as **Emission Trading Systems (ETS)**, include both "cap-and-trade"[1] and "baseline-and-credit"[2] systems whose credits are used for compliance with regulations. For example, under Alberta's ETS, compliance obligations are facility-specific and encourage the reduction of GHG emissions by establishing allowable emissions based on a pre-determined benchmark.

VCMs are markets where individuals or organizations trade carbon credits issued by independent carbon crediting programs. These credits are then purchased on a VCM and used to voluntarily offset a carbon footprint. They provide a mechanism for organizations to offset their GHG emissions outside of compliance markets.

Table 1 summarizes the key differences between the voluntary and compliance carbon markets.

1 A "cap-and-trade" mechanism has two critical components — an upper limit (or cap) on absolute greenhouse gas (GHG) emissions set by a regulatory body, and tradable allowances that sum up to the total amount of the cap. Each of these allowances serves as a permit for holders to emit one tonne of CO2e. The cap typically declines annually.

2 Under the performance-based "baseline-and-credit" system, the regulatory body sets the baseline of absolute emissions or emissions intensity for regulated entities. Similar to the "cap-and-trade" system, the baseline is tightened over time. Regulated entities who emit below the baseline receive surplus credits from the government for the difference. If they exceed the baseline, they can buy surplus credits on designated registries to meet their compliance obligation or in some cases pay "to pollute" as there is often no fixed cap such as with a cap-and-trade system. In Canada, the federal and provincial Output-Based Pricing System (OBPS), uses the baseline-and-credit design. The OBPS is one part of Canada's carbon pollution pricing system.

Table 1 Overview of the differences between voluntary and compliance carbon markets

	Voluntary	Compliance
Main purpose	For companies or individuals to voluntarily offset their hard to abate carbon emissions	For regulated entities to meet compliance obligations (e.g., high emitters, such as oil & gas facilities or cement plants)
Nature of the tradable units	Heterogenous commodities with supply that is driven by economic factors and the ability to sequester/ reduce/avoid carbon emissions	Primarily homogenous commodities with often finite and gradually reduced supply
Overarching framework	Market-led initiatives such as the Integrity Council for the Voluntary Carbon Market (ICVCM) – see here for further description. Market is decentralized and largely unregulated	Established, regulated and enforced by respective jurisdictions
Carbon crediting program (described here)	Non-governmental organizations (NGOs), typically non-profit organizations (NPOs)	Regulatory agencies or their delegates
Market participants	Project developers (sellers), investors, carbon crediting programs, verification and validation bodies, sell-side intermediaries, end buyers. These market participants are further described here	Regulated entities covered by the compliance market, regulators, verification and validation bodies; investors and market speculators (only when a derivative market exists)

Purpose of VCMs

There has been a notable increase in the number of companies setting GHG emissions reduction targets in recent years. IFAC's research, The State of Play: Sustainability Disclosure & Assurance 2019-2021, Trends & Analysis, based on 1,350 of the largest stock exchange listed companies in 21 jurisdictions found that 67 per cent disclosed emissions targets in 2021. In addition, using 2022 sustainability reports of Canadian companies on the S&P/TSX Composite Index, the ISF found that 134 firms (57 per cent of index companies) have a GHG emissions reduction target, an increase of 113 from the previous year.

To reduce emissions, companies can use a range of climate adaptation and mitigation strategies including shifting to suppliers with a lower carbon footprint, switching to renewable energy, and modifying operational processes (e.g., reduced business travel, implementing energy efficiency strategies). However, certain emissions are harder to abate, such as where

there are scale, technology and/or cost limitations. For example, airlines currently have few cost-effective readily available options to reduce their GHG emissions from aviation fuel to achieve emissions reduction targets. Thus, the demand to "offset" an organization's actual emissions is present across many industries and sectors.

VCMs allow suppliers of carbon credits to trade with those that have fewer opportunities to remove carbon in a market. Without the markets, suppliers of carbon credits might have little incentive to remove carbon, particularly if doing so is costly. By establishing VCMs, capital can be allocated to fund initiatives such as nature-based climate solutions (e.g., afforestation/reforestation, wetland restoration) and innovative, low-carbon technologies (e.g., carbon capture and storage, transportation electrification). VCMs also have the potential to help facilitate the estimated US$ 9.2 trillion annual financing gap necessary to achieve a net zero carbon transition by 2050 and attract more capital towards nature-positive projects and support developing countries' pursuit of their Sustainable Development Goals (SDGs).[3]

Why purchasers need to understand VCMs

Although VCMs have the potential to help finance the transition to a greener economy, many purchasers are wary due to reports of varying quality of issued credits. It is important to understand the attributes that could contribute to the quality of a carbon credit.

Low-quality credits generated from projects that do not achieve their planned carbon emissions reductions or removals may be misleading to end buyers and detrimental to buyers' reputations. Carbon credits are prone to uncertainties, and sometimes even fraud and manipulation, because of ungrounded additionality, issues with permanence, leakage and negative impacts on Indigenous peoples and local communities (these are all further described here).

Size of VCMs

As GHG emissions reduction targets have risen in the past decade, so has the size of VCMs, with the total value of VCMs reported to have reached US$ 2 billion globally in 2021, quadrupling in value since 2020.[4]

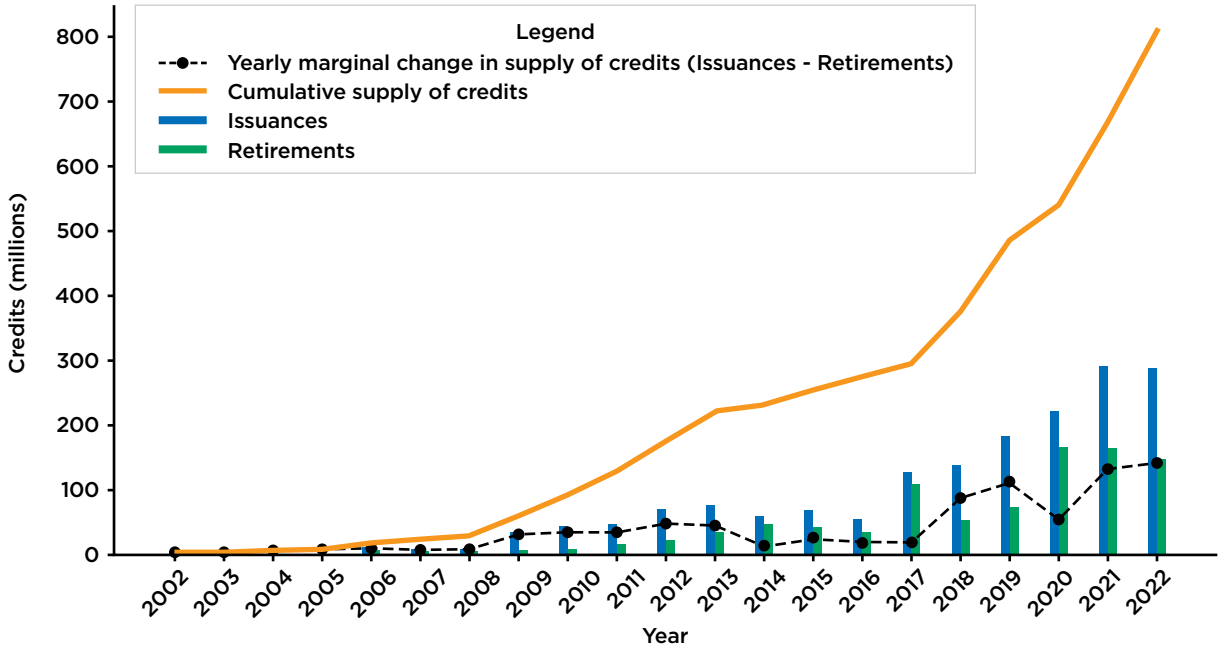
The size and growth of VCMs are highlighted in Figure 1. The red line shows the cumulative total number of issued minus retired credits, or simply the total supply, from the top four voluntary carbon crediting programs globally — Verra's Verified Carbon Standard (VCS), Gold Standard (GS), Climate Action Reserve and American Carbon Registry. The total supply of credits from these four carbon crediting programs has increased from 174 million to 807 million credits over the last decade.

3 United Nations Environment Programme, "State of Finance for Nature 2021," 2021

4 Anders Porsborg-Smith et al., "The Voluntary Carbon Market: 2022 Insights and Trends," January 2023, https://www.bcg.com/en-ca/publications/2023/why-the-voluntary-carbon-market-is-thriving

The annual retirement of carbon credits reflects how much they are used, usually by offsetting them against a company's total GHG emissions for the year, when compared to progress against commitments. For the past 20 years, there has been a consistent increase in annual retirements. However, in the past three years, growth has levelled off. In 2020, there was a noticeable increase in the use of carbon credits, as credit retirement peaked without a commensurate increase in issuance. One possible reason for the sudden increase in retirement volumes could be companies' enhanced focus on Environmental, Social and Governance (ESG) metrics and net-zero target-setting a few years prior to 2020. As a result, companies started to purchase carbon credits and claim them against their carbon reduction targets around that time. Another reason for plateauing retirements may be that carbon credit buyers are holding onto credits in anticipation of higher carbon prices and asset appreciation for the underlying credits.

Figure 1: Carbon credits issued and retired by the top four voluntary standards/registries



Note: Graphic developed by authors using data from Berkeley's Voluntary Registry Offsets Database. Credits given a "cancelled," "rejected by administrator" or "withdrawn" status have been excluded. Issuance year refers to when the registry issued the credit. Cumulative supply of credits is calculated by taking the cumulative running total of annual issued credits minus retired.

Data source: Ivy S. So, Barbara K. Haya, Micah Elias. (2023, May). Voluntary Registry Offsets Database, Berkeley Carbon Trading Project, University of California, Berkeley.

Types of carbon credits

Carbon credits can be generated from many different project types. At a high level, carbon credits can be categorized into two groups: removal and avoidance. **Avoidance** carbon credits are generated by the cessation of current or planned activities thereby reducing emissions being released into the atmosphere (they are sometimes referred to as reduction projects). Examples include stopping the conversion of grasslands to croplands, reducing timber harvests or converting a facility from fossil fuels to renewable energy. **Removal** carbon credits are generated from activities that remove carbon from the atmosphere, such as afforestation or carbon capture technologies.

Avoidance projects are more difficult to measure and verify, and as a result, many stakeholders question the accuracy of the claimed contribution to reducing emissions. Avoidance projects require the analysis of the difference between actual emissions and modelled counterfactual emissions that do not include the avoidance project. Removal projects can be compared to a pathway that is trending to zero. As a result, buyers are showing increased interest in removal projects.

An example of a carbon removal project is direct air carbon capture and storage, a technology and process that is still nascent. For example, in 2021, Climeworks, a Swiss-based company opened a direct air capture and storage plant in Iceland that claimed to be capturing 4,000 tonnes of CO_2 per year.[5] They are also currently developing a larger plant scheduled to open in 2024 with a capacity of 36,000 tonnes of CO_2 per year. As a reference point, Canada emitted 670 million tonnes of CO_2e in 2021. A concern with the promise of future removal technology is that it can disincentivize efforts to actively reduce and remove emissions today. The potential to scale removal technologies is unproven so there is a risk involved with being overly reliant on this plan.

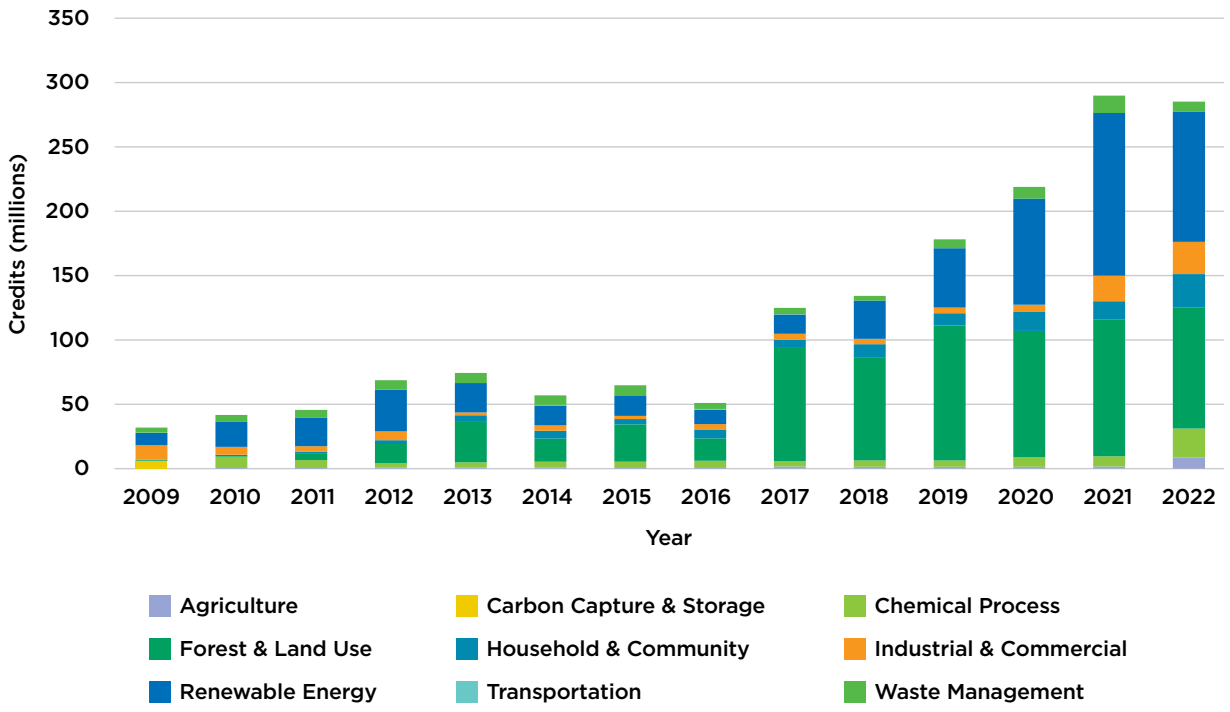
Projects can also be further categorized by specific types of carbon credits. The Berkeley Carbon Trading project collects and provides data on credits listed globally by the four major offset project registries that can be used to highlight the various carbon credit types.

Figure 2 below shows carbon credit issuances from 2002 to 2022, grouped by nine main project categories — forestry and land use, renewable energy, household and community, industrial and commercial, waste management, chemical processes, agriculture, carbon capture and storage, and transportation. Under each category, there are more granular

5 Climeworks, "Our Journey to Gigaton Scale," n.d., https://climeworks.com/purpose

project types. For example, the forestry and land use category includes projects ranging from afforestation/reforestation and reducing emissions from deforestation and forest degradation in developing countries to avoided forest conversion and wetland restoration.

Figure 2: Carbon credit issuance by project category



Note: Graphic made by authors using data from Berkeley's Voluntary Registry Offsets Database. Credits are assigned a year based on issuance date. Credits given a "cancelled" or "rejected by administrator" status have been excluded.

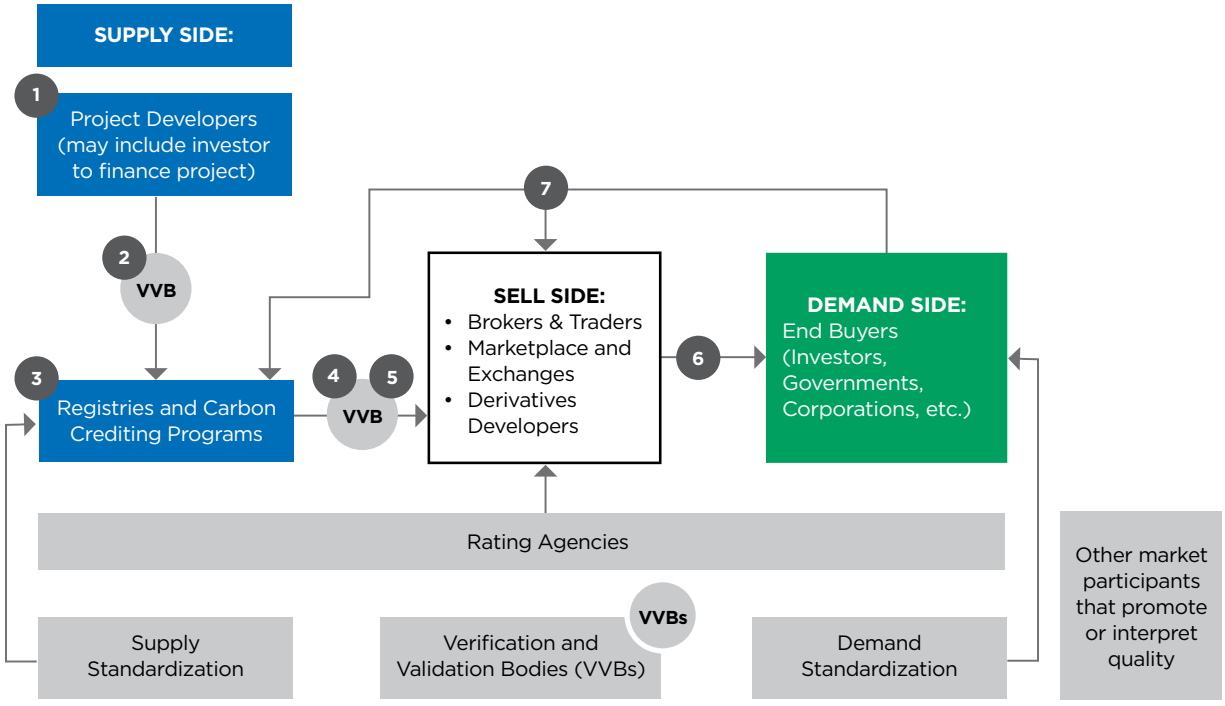
Data source: Ivy S. So, Barbara K. Haya, Micah Elias. (2023, May). Voluntary Registry Offsets Database, Berkeley Carbon Trading Project, University of California, Berkeley.

Voluntary carbon market ecosystem and market participants

Figure 3 depicts the voluntary carbon market ecosystem and market participants. It has been simplified based on IOSCO's VCM Consultation Report to focus on the elements relevant to purchasers.

For a detailed walkthrough of the carbon credit life cycle – from generation to retirement – please refer to Appendix A. The steps described in Appendix A within the life cycle correlate to the numbers in Figure 3 below.

Figure 3



Note: Graphic derived from IOSCO's VCM Consultation Report

Data source: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

Table 2 outlines the role of each of the key participants actively involved in VCMs with examples.

Table 2: Roles and examples of VCM participants

Participant	Role
Project developers (i.e., sellers)	Plan and implement activities to generate carbon credits using investment capital and/or grants from investors, non-profits, governments, etc. (e.g., Wildlife Works Carbon, Finite Carbon, Anew Environmental)
Investors	Provide capital to finance carbon offset projects. (e.g., Banks, NGOs, governments, end buyers or other specialized companies[6] that provide financing to project developers)
Carbon crediting programs	Carbon crediting programs have two main functions: 1. Setting standards for project design and implementation, GHG quantification, monitoring and reporting. They certify eligible projects and issue carbon credits. Carbon crediting programs may also be referred to as a standards organization, carbon crediting schemes, carbon offset program or scheme, or a certification body. 2. Maintain a carbon credit registry that tracks certified projects, issuance and retirement of carbon credits. (e.g., Verra, Gold Standard, Climate Action Reserve, American Carbon Registry)
Verification and validation bodies (VVBs) (may be referred to as third-party auditor)	Validate the project plans. Verify that the emissions removals or reductions reported by the project developer are real and measurable. (e.g., VVBs listed on Verra; Gold Standard approved VVBs)
Sell-side intermediaries (brokers & traders, marketplaces & exchanges, derivative developers)	Facilitate sale of credits to end buyers. (e.g., Xpansiv CBL, AirCarbon Exchange, Cboe Canada)
End buyers	Purchase credits to offset their own emissions; speculate on the VCM market through derivative trading. (e.g., Companies from various industries; hedge funds and banks engaged in over-the-counter (OTC) or exchange-traded derivatives in VCMs)

6 Companies such as Carbon Streaming Corp, Green Star Royalties and Key Carbon are emerging financiers that finance project developers based on a "streaming" or "royalties" structure. Such financiers provide up-front cash in exchange for a future stream of carbon credits at a discounted price ("streaming") or a revenue percentage from the sale of carbon credits ("royalties").

Other market participants aiming to build integrity in VCMs	Role
Carbon credit rating agencies	Carbon credit rating agencies which are unregulated (e.g., BeZero, Calyx, Renoster, Sylvera, etc.) have emerged to help build transparency in the VCMs. Carbon credit ratings are an evaluation of a particular claim and are most commonly given for the risk that a carbon credit is not delivering the GHG mitigation it claims. We will explore how purchasers can utilize carbon credit rating agencies in their investment decisions in future instalments.
Market-led initatives promoting supply and demand standardization	These initiatives are further described **here**.

Key factors for purchasers to consider in relation to the carbon credit life cycle

This section of the report describes the key considerations and prevalent criticisms that purchasers should be aware of, drawing insights from our desktop research.

In addition to the considerations below, it is important to highlight the elevated risks to society and the climate if carbon credits generated and used do not truly reflect reduced or removed carbon – i.e., carbon offset projects with low integrity distract society from genuine and tangible climate mitigation efforts, may not actually contribute positively to climate change mitigation, and therefore have a detrimental impact on society and the climate.

Conflicts of interest

VCMs have often been criticized for conflicts of interest in the carbon credit ecosystem. Generally, the conflicts of interest are thought to be a result of the remuneration mechanisms of the carbon crediting program. For example:

- Carbon crediting programs receive payment from the project developer for certifying carbon credits.
- The VVBs receive payment from the project developer for validation and verification services.
- Potential independence issues can arise between the project developer and carbon crediting program.

While these remuneration mechanisms are not necessarily uncommon, the lack of regulatory oversight exacerbates this potential issue.

Double counting

VCMs have often been criticized for the potential of double counting. Credits are initially added to a registry but may be transferred to another registry depending on secondary market trading. If the transfer is not recorded accurately, the carbon credit will exist on two registries, or in other words, be double counted. In addition, since the onus of declaring a retirement is on the end user, the credit can theoretically be “used” as an emissions reduction multiple times.

Transparency and accuracy of emission reduction calculation

A robust process for quantifying the benefits related to the avoidance, removal or reduction of carbon emissions is essential to the integrity of VCMs. Currently, the projects underlying carbon credits appear to be of varying quality related to whether the project has avoided, reduced or removed the GHG emissions as claimed. There are different methodologies available to quantify the amount of GHG emissions avoided, removed or reduced, however, there is little agreement on which methodology is most appropriate even within specific project types.

Quality of carbon credits

The assessment of the benefit related to the avoidance, removal or reduction of GHG emissions is subject to significant uncertainty, which can impact the perceived quality of a credit. Some of the factors impacting quality include:

Additionality

Additionality is a core factor in assessing the quality of a carbon credit. It must be proven that the project caused the reduction in GHG emissions (i.e., it would not have happened without it). Additionality is hard to establish as it involves statistical modelling and estimating what would have happened under different circumstances. There is also an incentive to model a baseline of, for example, aggressive deforestation (beyond past practices in the area) so more credits can be generated by claiming an avoidance of that future outcome. A study by the University of Cambridge in 2022 found rainforest credit projects overstated the actual threats faced by these ecosystems by an average of ~ 400 per cent.[7]

Issuing credits from renewable energy projects (the largest category by credits issued in 2022) will likely experience increased levels of scrutiny and overall skepticism. Assessing the additionality of renewable energy projects is challenging because the prices of solar and wind have fallen drastically over the last decade. In 2022, the global weighted average levelized costs of energy (LCOE) of onshore wind and solar were 52 per cent and 29 per cent lower than the cheapest fossil fuel-fired solutions.[8] Essentially, renewables are more cost-competitive than fossil fuels in most countries, even without financial support, which means the additionality criteria will be much harder to meet.

Carbon leakage

Carbon leakage refers to emissions moving from a protected to an unprotected area due to a carbon credit project. For example, the prevention of logging in one specific area does not directly affect global demand for logging products, so the reduced amount of logging (and the associated emissions) may merely shift to a different location.

7 Patrick Greenfield, "Revealed: More than 90% of Rainforest Carbon Offsets by Biggest Certifier Are Worthless, Analysis Shows," The Guardian, January 2023, https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe.

8 International Renewable Energy Agency (IRENA), "Renewable Power Generation Costs in 2019," June 2020, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Power_Generation_Costs_2019.pdf.

Permanence

Carbon credit permanence refers to how long removed carbon is stored and the related risks of storage reversal (i.e., carbon is released back into the atmosphere). This is important for nature-based carbon credits as wildfires, for example, can immediately reverse tree stored carbon. To deal with some aspects of this issue, carbon crediting programs will typically insure against the risk of storage reversal by setting aside a portion of credits commonly referred to as a buffer pool. Credits in this buffer pool can then be retired as needed to cover carbon losses from events such as fires or drought.

Negative impacts on Indigenous Peoples and local communities

Projects have been criticized for not adequately considering the rights of Indigenous Peoples and local communities if, for example, rights to carbon and tradable emission reductions connected to their land are not explicitly defined. As a result, the value of these projects may not fairly flow to the Indigenous communities. This could be viewed as exploitative and result in an overall negative social impact. In turn, the value of the carbon credits generated from the project may be impacted.

A recent example was a Kenyan program for reducing deforestation that led to the forced eviction of thousands of Indigenous people from their ancestral lands and forests.[9]

The considerations and uncertainties noted above may also increase the risk of fraud and manipulation within VCMs given the opportunity and financial incentive. Certain projects and even carbon crediting programs have been criticized and accused of fraud.

9 "Kenya: Sengwer Evictions from Embobut Forest Flawed and Illegal," Amnesty International, May 2018, https://www.amnesty.org/en/latest/news/2018/05/kenya-sengwer-evictions-from-embobut-forest-flawed-and-illegal/.

Other market participants

In an attempt to address issues with VCMs, groups of interested and affected parties have created initiatives and governance bodies. Two examples of these include the ICVCM and the VCMI. The ICVCM focuses on the supply side (i.e., the integrity of the carbon projects and carbon credits themselves) and the VCMI focuses on the demand side (i.e., the integrity of the claims made by individuals and businesses buying carbon credits) of the market.

The Integrity Council for Voluntary Carbon Markets

The ICVCM is an independent governance body for VCMs, founded by philanthropic foundations, universities and environmental NGOs, that aims to enforce a set of standards and takes a "regulatory-like" approach to increasing credit integrity. The goal is to help scale VCMs by promoting core principles in the generation process through the carbon crediting programs that result in carbon credits that are genuine, additional, verifiable and future focused to enable better "climate resilient development."[10] The ICVCM has released 10 Core Carbon Principles (CCPs) that serve as a "global benchmark for high-integrity carbon credits that set rigorous thresholds on disclosure and sustainable development."[11] The 10 principles are broken down into three main categories: governance, emissions impact, and sustainable development.

ICVCM has also released an assessment framework that can be used to assess whether carbon crediting programs and categories of carbon credits meet the CCPs. Carbon crediting programs (those established by standards organizations for specific project types) can apply to the ICVCM to have their carbon crediting programs assessed for CCP-eligibility. If successful, carbon credits from approved categories generated under that carbon crediting program will be labeled "CCP-Approved." Generally, the label is designed to help VCM participants identify high-quality carbon credits.

10 The Integrity Council for the Voluntary Carbon Market (ICVCM), "About the Integrity Council for the Voluntary Carbon Market," n.d., https://icvcm.org/about-the-integrity-council/.

11 The Integrity Council for the Voluntary Carbon Market (ICVCM), "The Core Carbon Principles," 2022, https://icvcm.org/the-core-carbon-principles/#:~:text=The%20Core%20Carbon%20Principles%20(CCPs,on%20disclosure%20and%20sustainable%20development.

Currently, the ICVCM has received applications from six carbon crediting programs and its assessment is ongoing (check the status here).

Purchasers are still cautioned to conduct their own due diligence before purchasing carbon credits and understanding the 10 CCPs aim to help purchasers critically assess carbon credits.

Voluntary Carbon Markets Integrity Initiative

The VCMI is an international non-profit organization that published a Claims Code of Practice in November 2023 that aims to build trust and confidence in how companies engage with VCMs. Under VCMI's Claims Code, companies can use carbon credits to make "Carbon Integrity" claims. We will explore the use of the Claims Code in future reports.

Valuation and pricing

Pricing diverse credits

Carbon credits are priced based on several factors that are outlined below. In a perfect marketplace, the attributes discussed here would be appropriately factored into the pricing of carbon credits. However, given the lack of regulatory oversight and transparency, pricing is not as correlated to actual quality as it is in an efficient market.

Project type

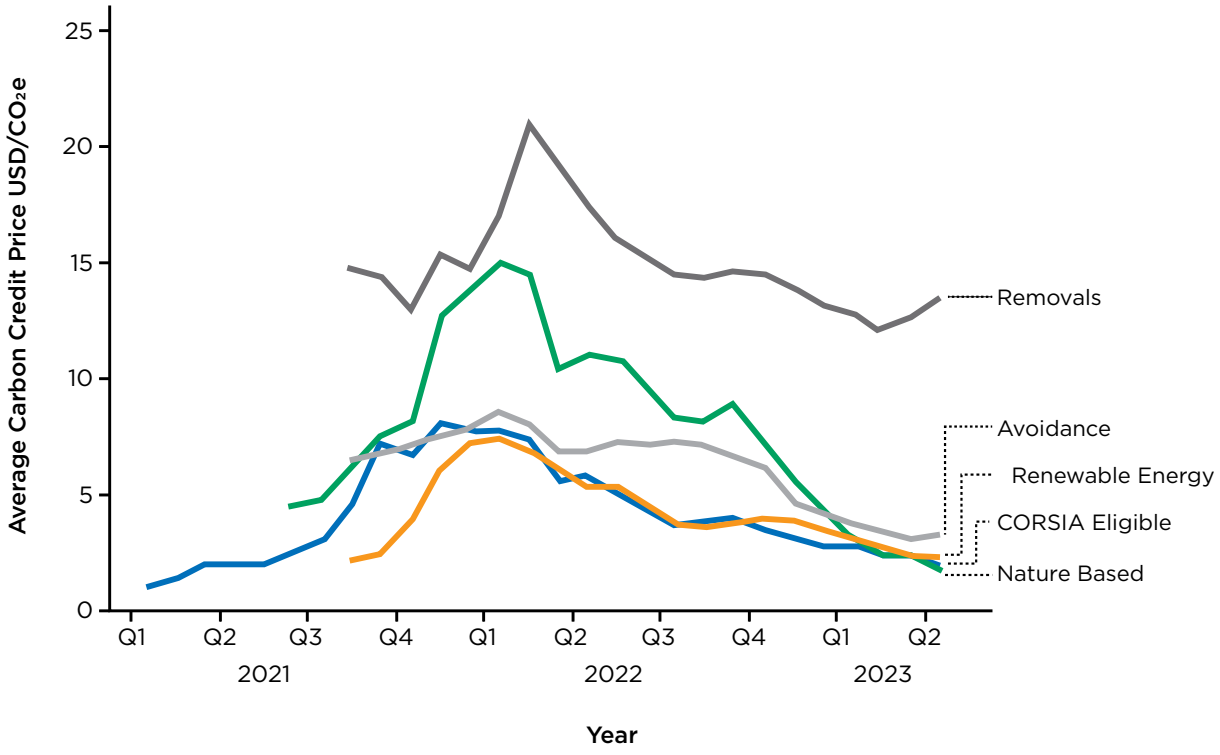
The type of underlying projects, especially the difference between removals (e.g., tech-based) and avoidance/reduction, largely dictates the price. Compared to avoidance credits, removals can more easily demonstrate their additionality and permanence (discussed here), two criteria emphasized by the CCPs. Therefore, their impacts are easier to verify, and these projects are perceived to have higher quality/value than avoidance projects.

Evident from the latest pricing trajectories published by the World Bank[12], credits linked to removal projects are trading at a high premium compared to avoidance credits (see Figure 4). The tech-based removal credits (e.g., direct air capture) are also more expensive because of the intensive capital required to develop these projects. Despite the relatively higher price tag, the demand is expected to grow in the coming decade – more than half of the companies (over 200 in total) in a Boston Consulting Group (BCG) survey expect removal credits to dominate their portfolio by 2030.[13]

12 World Bank, "State and Trends of Carbon Pricing 2023," May 2023, https://openknowledge.worldbank.org/handle/10986/39796.

13 Anders Porsborg-Smith et al., "The Voluntary Carbon Market: 2022 Insights and Trends," January 2023, https://www.bcg.com/en-ca/publications/2023/why-the-voluntary-carbon-market-is-thriving.

FIGURE 4: PRICES OF STANDARDIZED CARBON CREDIT CONTRACTS (2021-2023)



Source: World Bank, "State and Trends of Carbon Pricing 2023." Based on data from S&P Global Platts, 2022.

Notes: The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) program is a global offsetting scheme managed by the International Civil Aviation Organization (ICAO). To achieve the goal of carbon-neutral growth from 2020 onwards, airlines within scope are required to monitor and report their emissions. For those hard-to-abate emissions above the baseline, airlines are required to purchase carbon credits eligible under CORSIA. Many of the independent crediting programs in VCMs are CORSIA-eligible. The current eligibility requirements can be found here.

Co-benefits

Carbon credits sometimes have benefits that go beyond carbon reduction. For example, Gold Standard was established with the vision to drive value creation across the 17 SDGs. Certain carbon credit generating projects also have particularly valuable co-benefits.

For example, afforestation and reforestation projects are integral to conserving our nature and biodiversity. Beyond their carbon storage and sequestration functions, these nature-based projects create value through alternative means such as providing flood protection and biodiversity. Increasingly, companies are considering nature-related risks and willing to invest more in nature-based solutions.

Similarly, a clean cookstove project in lower income communities can improve the livelihoods and health of residents through reductions in harmful smoke. The positive social impacts might have a greater impact than the reduction in GHG emissions.

Some purchasers might be willing to pay more if co-benefits align with their strategy in corporate social responsibility. Due to the lack of granular project-level data, it is uncertain exactly how this affects pricing.

Methodologies

The stringency in the project methodologies (often referred to as protocols) used will directly impact the quality of the projects, and therefore, the price of credits associated with them. However, certain methodologies endorsed by standards organizations have lost some credibility in the past. Overall, the quality and robustness of a credit's underlying methodologies will affect its price and quality.

There are numerous methodologies used to quantify carbon credit project benefits. For instance, Verra's VCS Program lists dozens of approved methods to quantify benefits for projects ranging from "Conversion of Low-Productive Forest to High-Productive Forest" to "Calculating GHG Benefits from Preventing Planned Degradation." It is unclear exactly what the approval process entails. VCS states "All methodologies undergo a rigorous review and transparent stakeholder consultation process to ensure they meet the rules and requirements of each program." Reviews are done at least once every five years, or when needed, which determine if methodologies need to be revised or made inactive. Stakeholders can also submit new methodology ideas or revisions.

Vintage year, project locations and sizes

Other factors such as the vintage year (i.e., the issuance year), location and size of a project might also affect price.

Typically, projects with a recent vintage trade at higher prices than older projects. Some purchasers may be concerned that older credits are still on the market because of quality issues.

A smaller-sized project located in emerging economies that has the potential to generate co-benefits is often more expensive to develop. As a result, there is generally a price premium caused by both the co-benefits and higher project costs.

Box 3 Fairtrade Minimum Price for carbon credits

To support small and rural communities who develop VCM projects, the Fairtrade Climate Standard developed by the Fairtrade International and the Gold Standard advocates a minimum price that covers the average project costs (see Equation 1).[14]

Equation 1 Fairtrade minimum pricing model

Fairtrade minimum price = Investment cost + project cost + carbon cost (associated with registration, verification, certification, training etc.) + business margin – revenues[15]

It is highly dependent on project types, locations and project developers.

In practice, the Fairtrade minimum price can serve as a starting point during price negotiations between the sellers and end buyers.

Price forecasts

Carbon credit prices are volatile. The markets that they trade on are still new and as such prices have not stabilized or shown a clear trend. The future price of carbon credits largely depends on the structure of the market. For instance, Bloomberg created forecasts for credits under three main future scenarios:

Scenario (1) The voluntary market scenario assumes no fundamental changes about the offset market, with companies buying all types of offsets.

Scenario (2) The removal scenario assumes companies can only buy removal offsets to achieve net-zero goals.

Scenario (3) The bifurcation scenario has the market splitting in two, with a smaller market for expensive high-quality credits and a larger market for everything else.

Under these three scenarios, Scenario (2) leads to the highest forecasted price with an average of US$127/tonne by 2050. This contrasts with an average of just US$18/tonne in Scenario (1). The third scenario will see prices kept at a "reasonable" level, between Scenarios (1) and (2).[16]

There are a few key factors that help explain these divergent price forecasts. A fragmented market that contains all types of credits will have a much higher supply which leads to lower prices. Furthermore, this market will have lower-quality (avoidance/reduction) credits mixed in with higher-quality removal ones – likely resulting in depressed market values for all credits.

14 Gold Standard, "What is a carbon credit worth?", https://www.goldstandard.org/news/what-is-a-carbon-credit-worth

15 Gold Standard, "CARBON PRICING: What Is a Carbon Credit Worth?," n.d., https://www.goldstandard.org/blog-item/carbon-pricing-what-carbon-credit-worth.

16 Bloomberg, 2023. "Long-term carbon offsets outlook 2023."

Other factors that can influence the price of carbon credits include new regulations and international agreements. For instance, the EU tightened the regulation around green marketing based on carbon credits, for example, "climate-neutral" and "climate-positive" claims relying on emissions offsetting schemes.[17] These rules can lower demand for offset credits and thus put downward pressure on the price.

17 European Parliament, 2023. "EU to ban greenwashing and improve consumer information on product durability."

Recent developments

At COP28 in December 2023, there was a global consensus on the critical role that high-integrity VCMs can play in mobilizing private finance towards reaching the Paris Agreement goals of limiting global temperature increases.

A group of European countries proposed six joint recommendations to prevent greenwashing and restore integrity in VCMs, which include ensuring Paris-alignment and prioritizing emissions reductions before resorting to carbon credits.

The Board of IOSCO published a consultation paper which proposes 21 Good Practices to facilitate transparent and accessible VCMs. The scope of consultation includes primary market issuance, secondary market trading and the broader governance and risk management approach to VCMs.

Through a collaborative campaign, six organizations including the VCMI, ICVCM and Climate Disclosure Project (CDP) showcased their distinct roles in helping companies achieve their net-zero targets. They emphasized the importance of helping companies decarbonize their operations and value chains, and address residual emissions through high-integrity VCMs.

Six independent VCM standards organizations announced a collaboration to scale and amplify the impacts of VCMs. The six standards organizations pledged to seek standards alignment to core principles for the quantification of and accounting of removals and reductions.

Conclusion

Although VCMs are complex and face criticisms and risks, they have the potential to facilitate real climate mitigation solutions necessary to meet the Paris Agreement goals and countries' NDCs. By understanding the market participants and their role, the generation process, and items to consider when purchasing carbon credits, purchasers will be able to critically assess projects, project types, carbon crediting programs and, ultimately, carbon credits.

Future instalments in this series will dive deeper into the accounting and verification issues, new and upcoming disclosure requirements, the use of carbon credits in Canada and around the world and will explore the accountancy profession's potential role in enhancing the integrity of VCMs and building a trusted market.

Resources

1. Berkeley Public Policy — The Goldman School, Voluntary Registry Offsets Database
2. The Integrity Council for the Voluntary Carbon Market
3. IOSCO VCM Consultation
4. World Bank. 2023. State and Trends of Carbon Pricing 2023
5. Bloomberg. 2023. Long-term carbon offsets outlook 2023

Appendix A: Carbon credit life cycle from generation to retirement

Step 1: Project planning and design
A project developer plans a project that reduces, removes or avoids emissions. The project needs to be designed in accordance with the applicable methodologies of the carbon crediting program, as a prerequisite for having carbon credits issued from the project. For example, Verra, one of the world's largest carbon crediting programs, has more than 40 active project methodologies tailored to a wide variety of projects ranging from renewable energy to carbon capture and storage (such as from CO_2 utilization in concrete production). The type of project will also affect the timeline for carbon credit generation. Some projects can take as little as a year or can take well over 10 years. For example, sequestration projects can have a crediting period – the time during which a mitigation project can generate offsets – of up to 100 years.

Through documentation, the project developer must demonstrate that the proposed project has correctly applied the selected methodology and will generate tradable carbon credits. The documentation of the proposed project is usually available for a public comment period, which is typically available on the carbon credit program's website.

These projects require sufficient capital, which project developers can source with financing and investments from investors, non-profits or local governments. Generally, any entity or individual can develop projects.

Step 2: Validation of project plan
An independent, third-party VVB, hired by the project developer, validates whether the information provided by the project developer (plans, project methodology, estimates, etc.) is reasonable through site visits, stakeholder consultation, and other procedures. If the proposed project fits the eligibility criteria under the selected methodology and standard, the VVB then issues a validation report. The validation and verification documentation will be available on the registry for public consultation, once the project proceeds to Step 3 – Project registration and implementation. Oftentimes, the carbon crediting programs require the project developers to communicate the project information by posting it on their own website, too.

VVBs need to be accredited by bodies recognized by the carbon crediting programs. For example, Verra's carbon crediting program accepts third-party auditors who possess credentials under VCS-eligible international programs such as the United Nations Clean

Development Mechanism (CDM) or that have been accredited by an International Accreditation Forum (IAF) member body for ISO 14065 scope VCS. Currently, the Standards Council of Canada is one of the eligible accreditation bodies.

Step 3: Project registration and implementation
A project developer registers the project with the registry that will ultimately issue the carbon credits. Before registration occurs, the registry reviews the validation report to determine whether the project meets its requirements. Upon registration, project developers can start developing and implementing the projects as designed in the proposal.

*Note: As mentioned earlier, the registry and carbon crediting program are often the same organization.

Step 4: Project execution – Measurement, reporting and verification (MRV) process
Throughout the project lifecycle, an MRV process is in place to ensure the project's integrity. During the measurement period, the project developer measures and reports GHG emissions reductions, avoidance or removals. This step can span a long period of time, resulting in projects that take well over 10 years. For example, credits must show permanence, which in the example of carbon sequestration could span decades.

The VVB verifies whether the results claimed are accurately quantified based on the applicable methodology and standard. Independent verification is one of the most important steps before the issuance of a carbon credit. In terms of credentials, the same criteria apply to the validation process. The same VVB can validate the project in step #2 and verify the emissions reduction, avoidance or removal in step 4 for the same project, however, it does not have to be the same VVB.

Step 5: Certification and issuance of carbon credit
The carbon crediting program certifies that the carbon credits achieved the outcomes as described, then issues the carbon credits to the registry, registered under the owner (for example, the project developer). The project developer can access the credits, each with a unique serial number, on its registry account (managed by the registry). The electronic registry systems keep the record of ownership, transfer and retirement of carbon credits.

Each credit has a specific 'vintage,' the year in which the emission reduction occurred, and a specific issuance date, when the credit is issued on the market. These dates may differ due to the length of the certification and MRV process; some carbon credits are issued years after the carbon reduction occurred.

Carbon credits can have different names representing the standards under which they are certified. For example, the credits issued by Verra's VCS program are called Verified Carbon Units (VCUs); the ones certified under Gold Standard, another leading registry, are called Verified Emission Reductions (VERs). Nevertheless, they all aim to represent the reduction or removal of one tonne of CO_2e.

Step 6: End buyer purchases carbon credit
After issuance, the credits are available for sale to trade. Buyers can purchase carbon credits (1) directly from project developers, (2) over-the-counter (OTC) through a trader/broker, or (3) via exchanges.

Exchanges create standardized products that group credits with similar underlying project attributes. For example, the Xpansiv CBL exchange, which is a global exchange platform for transacting energy and environmental commodity products hosts trading of Core Global Emissions Offset (C-GEO) contracts. These contracts represent underlying energy, renewable-based projects that meet integrity criteria defined by Xpansiv CBL. There are also other types available such as Nature-based GEO (N-GEO) contracts.

Standardized products may not appeal to buyers in search of specific project features. These companies may prefer non-standardized products as they allow a better understanding of the underlying projects. Conversely, buyers might prefer standardized products for their simplicity and fungibility.

Like other commodity markets, derivative products (mostly futures) exist for investors to speculate on carbon credits or specific types, such as nature or tech-based credits. They are traded in exchanges such as Xpansiv's spot carbon credit exchange CBL. Pricing and valuation of carbon credits is discussed in the body of this report.

How to purchase a carbon credit
There are two general avenues for purchasing carbon credits to offset GHG emissions:

1. Direct investment: This is a direct investment in a carbon credit project, such as funding a project in step 1. This option would often be for purchasers who have a long-term horizon as the generation of carbon credits could span over decades. It would also generally require a more substantial capital investment.
2. Broker/exchange: There are brokers and other online platforms/exchanges that connect buyers and sellers of carbon credits. Like any other transaction, in exchange for the transfer of funds, the buyer receives carbon credits. The broker or platform receives a fee for this service and completes the administrative aspects such as retirement of the credits (further described below).

Step 7: Carbon credit retirement
The last step in the process is credit retirement. This means that the credit is permanently removed from circulation. Only the owner of the credit who chooses to retire it can claim the emissions reduction. It can be difficult to verify that a credit has been formally retired. To improve this aspect, some organizations are turning to blockchain technology as it provides an open ledger that more transparently records this information.

The Berkeley Voluntary Registry Offsets Database states that "Credits are marked as retired once an owner notifies the registry that credits are being used towards a compliance or voluntary emissions target."

Glossary of terms

Term	Description
Additionality	Additionality means that the mitigation activity would not have occurred without the incentive created by carbon credit markets or mechanism.
Baseline-and-credit system	A type of compliance carbon market whereby baseline emission levels, i.e., target levels decided by the governmental authorities based on historical data and environmental objectives, are defined for compliance entities and allowances are issued to those that have reduced their emissions below that level.
Cap-and-trade mechanism	A type of compliance carbon market where governmental authorities set an upper limit on the total amount of CO_2 that an industry sector can emit. This cap is reduced over time by a predetermined amount. Governmental authorities issue carbon emission allowances that mandate the maximum amount of carbon that covered entities are permitted to emit. At the end of the compliance period entities must surrender allowances back to the governmental entity to cover the greenhouse gas emissions that they created.
Carbon crediting program (also known as **standard setters** and **certification bodies**)	Setting standards for project design and implementation, GHG quantification, monitoring, and reporting. They certify eligible projects and issue carbon credits. Carbon crediting programs may also maintain a carbon credit registry that tracks certified projects, issuance and retirement of carbon credits.
Carbon emissions	CO_2 and CO_2e emissions
Carbon leakage	Movement of emissions from a protected to an unprotected area due to a carbon credit project.
Carbon market	Market mechanism to put a price on carbon emissions and promote the reduction of CO_2 emissions into the atmosphere or allow for the compensation of emissions using climate change mitigation projects. In VCMs, carbon markets encompass primary market issuance and secondary market trading of carbon credits in centralized and decentralized (over-thecounter and bilateral arrangements) transactions.
Carbon Offset Credit (or **carbon credits** or **credits**)	A transferable instrument, representing an emission reduction or removal of one tonne of CO_2 or CO_2 equivalent (CO_2e).

Term	Description
Compliance Carbon Market (CCM)	A type of carbon market, also called Emission Trading Systems (ETS), created and regulated by mandatory national, regional, or international carbon reduction regimes. Their overall objective is to reduce CO2 emissions. There are two types of mechanisms within compliance markets, “cap-and-trade” mechanism and “baselineand-credit system”, and both use tradable allowances to give companies within specific industries, the right to emit one tonne of CO_2.
Double counting	Double counting refers to a situation where a carbon allowance, credit, or the underlying GHG mitigation these represent is claimed by more than one entity.
Measurement, reporting, and verification (MRV) process	Multi-step process to monitor/ measure the amount of GHG emissions reduced by a specific mitigation activity over a period of time and report these findings to an accredited third party. The third party then verifies the report so that the results can be certified, and carbon credits can be issued.
Nationally Determined Contribution (NDC)	NDCs form the basis for countries to achieve the objectives of the Paris Agreement. They represent a country’s climate action plan to cut emissions and adapt to climate change impacts. Since climate finance is key to implementing the plans, NDCs ideally also detail a financing strategy.
Permanence	Permanence refers to mitigation activity results that are not reversible or, where there is a risk of reversal, the assurance of be measures in place to address those risks and compensate for reversals.
Project developers	Project developers design projects, obtain funding and physically create the project. In some cases, the project developer may not be the same person as the owner of the land or assets forming part of the applicable climate change mitigation project.
Reduction or avoidance projects	Projects that reduce the amount of GHG emitted into the atmosphere.
Registry	Electronic system that tracks and records the issuance, ownership, transfer, and retirement of carbon credits and associated project information and documentation.
Removal and sequestration projects	Projects involving natural resources, engineering techniques, or technology to remove and durably sequester or store carbon from the atmosphere.
Retire	To retire or to offset a carbon credit refers to actions performed in a registry to formally and transparently remove a credit from circulation such that it cannot be further transferred or otherwise transacted.
Validation and Verification bodies (VVBs)	An independent entity that is accredited by a carbon crediting program to perform validation and/or verification assessments.

Term	Description
Validation	Validation is the ex-ante independent assessment of the project by a third-party entity that determines whether the project and its GHG statement conforms with the carbon crediting program rules, and evaluates the reasonableness of assumptions, limitations, and methods that support a claim about the outcome of future activities.
Verification	Verification is the periodic ex-post independent assessment by a third-party entity of the project and its GHG statement of emission reductions and removals that have occurred as a result of the project during the monitoring period
Voluntary Carbon Market (VCM)	A type of carbon market where entities voluntarily buy credits generated from projects that either (i) avoided CO_2 emissions, (ii) assisted in the reduction of emissions, or (iii) permanently removed emissions from the atmosphere, thereby allowing these buying entities to offset its own carbon emissions or those in its value chain that are hard to abate.

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