Ecosystem Marketplace
A FOREST TRENDS INITIATIVE

State of the Voluntary Carbon Market 2025

Meeting the Moment

Renewing Trust in Carbon Finance

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About Ecosystem Marketplace

Ecosystem Marketplace (EM), a non-profit initiative of Forest Trends, is a leading global source of credible information on environmental finance, markets, and payments for ecosystem services. For nearly two decades, EM has run the world's first and only globally recognized and standardized reporting and transparency platform for voluntary carbon market (VCM) credit pricing data, news, and insights.

EM's flagship State of the Voluntary Carbon Market reports and other analyses on carbon credit market dynamics (e.g., prices, volumes, projects, corporate buyers, sellers, etc.) and carbon standard issuance and retirement data have become anticipated industry staples. EM also provides a publicly accessible data intelligence dashboard and a news platform for market coverage.

EM data on prices, regulation, science, and other relevant issues on environmental services markets and climate finance have been used extensively by a range of market actors, from companies, journalists, and investors, to practitioners, natural resource agencies, academics, and local and indigenous communities

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Data on project registrations, credit issuances, and retirements come from the following project registries: ACR, ART, BioCarbon, CAR, Cercarbono (EcoRegistry), CDM, Global Carbon Council, Gold Standard, Plan Vivo, and VCS.

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Introduction

Over the 20-year history of Forest Trends' Ecosystem Marketplace (EM), we have seen carbon markets grow from a nascent idea into a mechanism with the potential to seriously mitigate global warming. State of the Voluntary Carbon Market reports have highlighted market trends and key developments in this actively evolving space, which has grown to meet a steady demand to offset greenhouse gas emissions (approximately 180-200 million tons of credits retired annually since 2021). Today, we continue to follow refinements in quality and integrity as the voluntary carbon market (VCM) works to transition to a new phase which reflects a greater focus on nature-based solutions, carbon removals, and interoperability with international compliance carbon markets.

While it will be tempting to readers to interpret the headline figures in this year's State of the Voluntary Carbon Market as a sign of weak demand for carbon credits, there is actually a very different explanation. This comes from EM's longitudinal experience and the "ear to the ground," thanks to the global network of market actors who share their data and insights with us.

What we are seeing is an ongoing reboot of the supply side of the VCM, in response to the growing sophistication of the demand side of the market. The legacy market of credits from older methodologies is winding down, while the next phase of the VCM, with a stronger emphasis on integrity, ramps up to scale. It is going to take time for the supply of credits to become available from new projects. In the meantime, steady demand from the end users of credits is pushing up the price of credits from the existing project types that are considered to be high quality. This could be a bumpy ride. The VCM is in the middle of a transition, and transitions take time and are often messy.

It is also important to note that while VCM transaction volumes have seen volatility of late, both across the complete market and within individual categories and project types, the pace of credit retirements has been much more stable over the past four years. This suggests that demand from end users retiring credits remains consistent.

It is not easy to separate these kinds of signals from the noise. The opacity of the VCM is one of its biggest weaknesses. Our position has long been that for the VCM to transition to a state of confidence and integrity, it must have transparency. Market actors and observers alike need access to reliable information to make informed decisions and accurately interpret why certain credits fetch certain prices and what that signals to the market.

As a community of practice working toward a common goal of driving investment in decarbonization and climate resiliency, VCM participants are laying the groundwork for businesses, institutions, and individuals to participate in multiple climate action pathways that fit their needs and values. These financial instruments are critical to bridging the major climate finance gaps that are so desperately needed. The shifts we're seeing in the market reflect the increasing sophistication and growing technical expertise of market actors and observers alike, especially compared to five years ago, ten years ago, and the very early days of the VCM.

After intense and sustained scrutiny of the VCM following a rapid increase in credit transaction and retirement volume in 2021 and 2022, we've seen market actors focus on rebuilding trust by creating guardrails to ensure market "integrity." This process has led to a flight to quality, with market actors learning by doing as they try to build consensus on and operationalize ever-more robust definitions of quality and integrity on both the supply and demand sides. In 2024, the ongoing decline in market value and transaction volume slowed, with demand growing for credits with multiple dimensions of integrity and quality. This served to bolster transaction volume for project types like Improved Forest Management and Landfill Gas Destruction, while other credit types that were constrained by supply saw

average prices increase, including Afforestation/Reforestation-Revegetation and Agriculture credits.

The data and insights in this report are the product of deep collaboration and mutual trust across the broadest network of market actors on the ground and stakeholders across the VCM value chain. Our team and network of advisors provide diligent analysis of market trends, informed by our collective and hard-earned wisdom over the last 20 years. By the time you read this, the report will be in the hands of our global audience of over 40,000 individuals who have come to rely on our work as a critical source of knowledge to understand the present state of the market, where it's going, and how those dynamics continue to play out in terms of the larger climate impact of the VCM.

We are deeply proud of these relationships and the credibility we've built over two decades. We know that our Respondents trust EM with their sensitive, confidential data because they also believe market transparency matters. We remain committed to delivering market analysis that bridges the knowledge gap and helps our readers understand opaque elements and segments of the market, but as a non-profit count on you to support this critical work.

It is our hope that the 2025 State of the Voluntary Carbon Market report will provide an indication of the most important issues facing the VCM in 2024 and beyond, as well as a glimpse of what can come next as the VCM continues to evolve to meet higher standards of quality and integrity.

Charlotte Barber, Associate Director, Ecosystem Marketplace
Alex Procton, Senior Manager, Data Solutions and Insights, Ecosystem Marketplace

Key Findings

1. **Total market transaction volume declined by 25 percent and average price declined by 5.5 percent in 2024.**

   - The total reported transaction value of the Voluntary Carbon Market (VCM) was $535M USD, a decrease of 29 percent from 2023.
   - The ongoing decline in the VCM that began in 2022 is gradually slowing. 2024 posted the lowest transaction volume since 2018, but market value is 1.9x higher than 2018.

2. While transaction volume, which is a proxy for VCM liquidity, continued to decline in 2024, **the volume of credits retired from the ten largest standards has plateaued at an elevated level since 2021, with 182 million tons of credits retired in 2024.**

   - Retirements of Forestry and Land Use credits remain steady at 68 million tons per year. Given concurrent declining retirements of Renewable Energy, Forestry and Land use became the most frequently retired credit type in 2024.
   - Credits from Household/Community Devices projects made up an increased share of retired offsets, reflecting sustained growth in project registrations and issuances in the category.

3. **There is a growing premium on credits from projects that remove carbon dioxide from the atmosphere** and sequester it in natural or engineered carbon pools. On average, removal credits are 381 percent more expensive than reduction credits in 2024—up from 245 percent in 2023.

   - Market share of removal credits has continued to grow slowly. Five percent of credits traded in 2024 originated from removal project types.
   - The price premium for removals substantially benefits nature-based credits from Afforestation-Reforestation/Revegetation (ARR), mangrove restoration, and agroforestry projects, which are the largest category of removal credits available today.

4. **The Integrity Council for the Voluntary Carbon Market's (ICVCM) Core Carbon Principles (CCPs) approval took center stage as an indicator of high quality.** Since only a relatively small share of project types was effectively approved during 2024 though, the effect on demand was isolated and overall market impact was relatively minimal.

   - Demand for Landfill Gas and Ozone Depleting Substances credits grew.
   - CCP-approved Reduced Emissions from Deforestation and Degradation in Developing Countries (REDD+) and ARR credits are not available on the market yet.

5. **Different categories of credits had different trajectories. Some categories gained market share while others saw volume or prices slip.**

   - **Forestry and Land Use transaction volume remained stable**, with average price declining in line with the broader market.
     - REDD+ continues to decline in market share (transaction volume fell 52 percent) while Improved Forest Management (IFM) saw explosive growth (transaction volumes grew over 3x).
     - ARR, Agroforestry, and Blue Carbon projects, which generate removal credits, saw average price increase by 20 percent.
   - **Waste Disposal volume grew over 3x, driven by demand for CCP-approved Landfill Gas credits.**
     - Biochar Production, which generates removal credits and is one of the smallest clusters in terms of transaction volume, had an average price of over $160 /metric ton of carbon dioxide equivalent (tCO_2e), over 25x the total market average price.

- **Credits from Renewable Energy projects continued to lose market share**, with transaction volume decreasing 23 percent in 2024.
    - Credits from biogas projects, which include Landfill Gas to Energy projects that may be eligible for CCP approval, are becoming more expensive while all other Renewable Energy clusters are seeing prices steadily decline.

6. **Buyer preference for credits from recent vintages reached unprecedented levels.** There was a 217 percent premium for credits with vintage from the last five years, compared to a 53 percent premium in 2023.
7. **Carbon market participants anticipate a positive impact on demand and supply in the VCM from Article 6 of the Paris Agreement**, but market participants don't view local jurisdictions as ready to engage with and implement Article 6 mechanisms.

Market Overview

Total Volume, Value, and Price

Section Insights

- 2024 marked the third year in a row of declining VCM transaction volume and market value, as the market continues to face dramatic fluctuations in fundamental supply and demand from credit standards and end users retiring credits.
- Total market value fell by 29 percent to $535M, a similar total value as in 2020, but this value was achieved with 84 $MtCO_2e$ of credits sold—just 40 percent of the 2020 transaction volume.
- The volume of credit retirements has remained steady even as issuance and transaction volume are in decline, indicating sustained fundamental demand for carbon credits even as market liquidity is strained.
- As a result, credit prices have remained structurally higher over the past three years. The average transaction price of $6.37 in 2024 was more than double the 2020 average price.

The past five years of market activity in the VCM have been marked by extreme swings in supply and demand: annual sales of carbon credits spiked in 2021 and have declined ever since, while retirement volumes remain elevated from 2021 onwards. For the third consecutive year, transaction volume and market value in the VCM declined in 2024, with EM Respondents submitting transaction data totaling 84 million metric tons CO_2e ($MtCO_2e$), representing a 25 percent fall in traded volume from the previous year (Table 1).

For the second year in a row, Respondents reported transacting fewer credits than were retired from the top ten carbon credit standards, suggesting declining inventories of the most sought-after credits in the face of sustained demand and bottlenecks in supply of new credits.

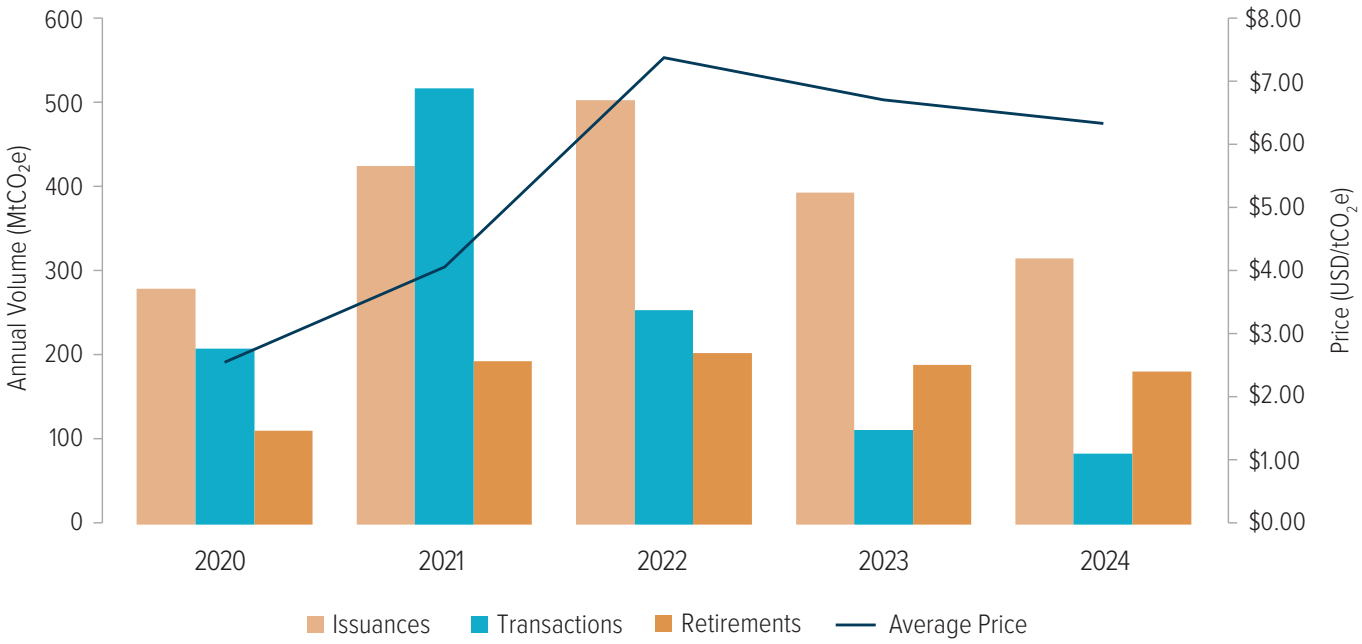
This was also the second year in a row of declining prices after a peak in 2022 of $7.37/$tCO_2e$. However, the rate of market contraction slowed in 2024 as credit prices held firm above $6/$tCO_2e$, more than double the average credit price in 2020 (Figure 1). Average credit prices fell slightly from $6.71/$tCO_2e$ to $6.34/$tCO_2e$, down six percent year-over-year. As a result of drops in both transaction volume and price, the total market value of the VCM fell by 29 percent, with a total value of $535M reported to EM in 2024 (Figure 2). This is a similar total value as was reported in 2020—however, given higher average prices in 2024, the volume of credit transactions required to generate that value was only 40 percent of the total volume in 2020 (Figure 3).

EM's estimates of transaction volume and market value are lower bounds for the VCM based on transaction data from actual credit sales, received from 82 EM Respondents with transactions in 2024, compared to 97 Respondents that reported transaction data in 2023. To understand the effect of the declining numbers of Respondents, we compared the transaction volume and average

Table 1. Annual Total Voluntary Carbon Market Transaction Volume, Value, and Price per tCO_2e for All Credits, 2023-2024

2023			2024			Percent Change		
Volume ($MtCO_2e$)	Value (USD)	Price	Volume ($MtCO_2e$)	Value (USD)	Price	Volume	Value	Price
112.4	$754.5M	$6.71	84.4	$535.1M	$6.34	-25%	-29%	-6%

Figure 1. Overview of Voluntary Carbon Market Issuances, Transactions, Retirements, and Average Price, 2020-2024



Note: This figure includes data on credit issuances and retirements from American Carbon Registry (ACR), Archictecture for REDD+ Transactions (ART), BioCarbon, Climate Action Reserve (CAR), Clean Development Mechanism (CDM), Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and Verified Carbon Standards (VCS) registries. Transaction volume and average price data are sourced from actual transaction data provided by EM's Respondents.

Figure 2. Voluntary Carbon Market Size by Value of Traded Carbon Credits, pre-2005 to 2024

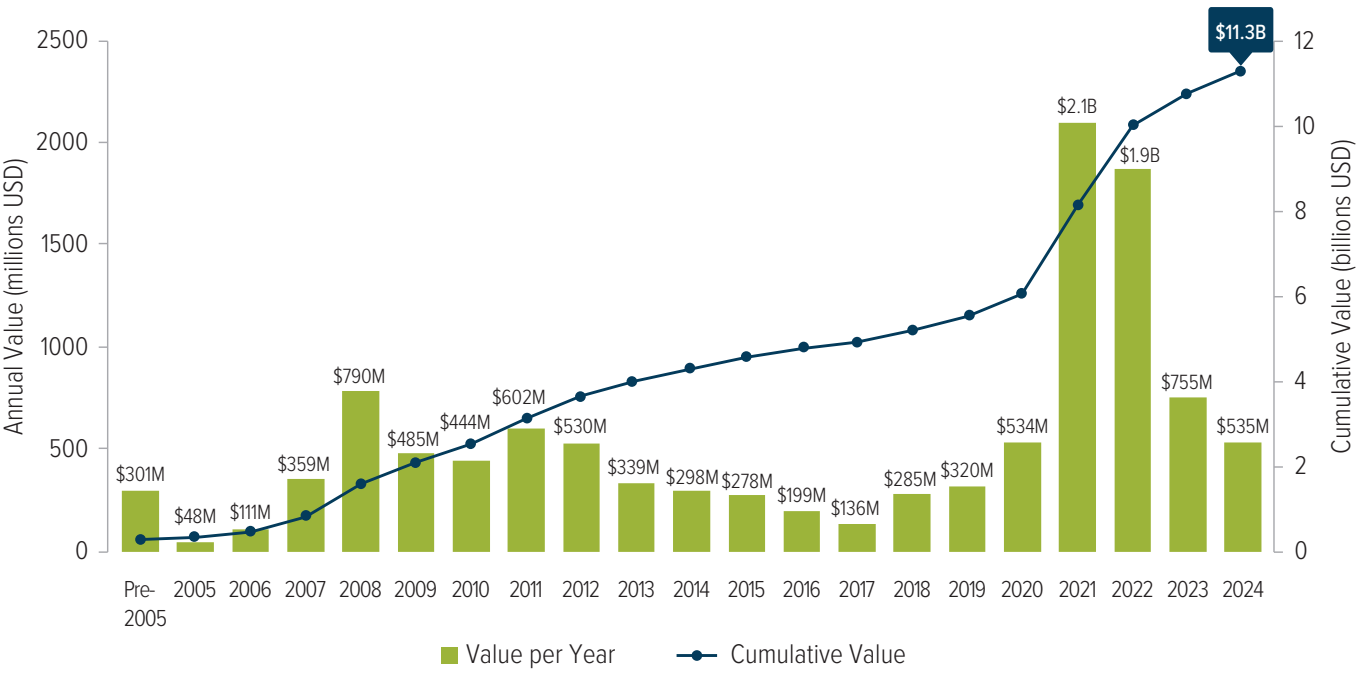
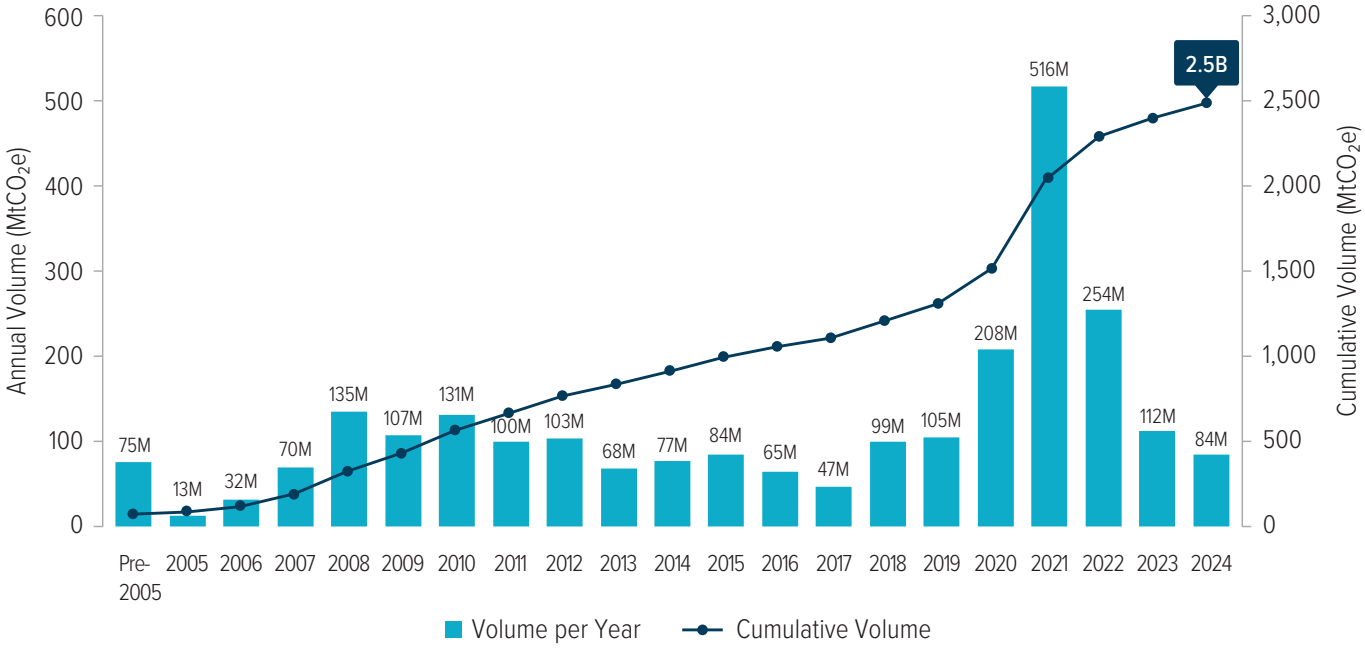


Figure 3. Voluntary Carbon Market Size by Volume of Traded Carbon Credits, pre-2005 to 2024



price for 61 Respondents who submitted data for both 2023 and 2024. Interestingly, this group saw a greater decline in reported transaction volume and average credit price in 2024 than the full sample of Respondents, whose volume declined by 31 percent and average price declined by 20 percent. New Respondents, on the other hand, saw an average transaction price that was 58 percent greater than the market average. While some new EM Respondents represent novel sources of supply from more expensive project types, like European nature-based projects, others are established VCM actors with a broader scope. Both types of new Respondents providing transaction data in 2024 added to the completeness of EM's network of carbon market actors and improved the quality of the analysis in this report. Market sentiments from Respondents completing our qualitative survey confirm the diversity of outcomes for market participants in 2024 (see EM Respondent Sentiments on the VCM in 2024, p. 29)

Further disaggregating transaction data by project category, region of origin, credit vintage, and other qualities of carbon credits supports the conclusion that the VCM is continuing a period of steady, comprehensive transformation after the unprecedented acceleration in market activity beginning in 2020. The continuing contraction is a transition from the exceptional period from 2020 to 2021, when the average annual market value was $2B per year (Figure 3). Over the last two years, as the VCM was subject to intense internal and external scrutiny, market actors have worked to develop the new project types, credit standards, governing boards, and independent quality evaluators that the VCM will need to sustain and scale for the next decades of climate action. The quantitative data in this report, as well as qualitative data gathered from our network of Respondents, indicate a complex trajectory for the VCM, but one which gives market actors some cause for moderate optimism looking at 2025 and beyond.

Box 1: What Is a Registry? Defining The Mechanics of Carbon Markets

In the VCM and compliance carbon markets, one term that is used repeatedly in different contexts is "registry." Depending on the situation, a registry can be a tool used by credit issuers or a database of credits that tracks what can be sold and retired for specific needs, e.g., compliance demand.

Key Terms

Standards: The organizations that define the project activities that can produce carbon credits and publish methodologies outlining the calculation of credits generated by a project, as well as approving and tracking project registration and credit issuance and retirement.

Registries: Can refer either to databases of registered projects and issued and retired credits maintained by standards, or to aggregations of credits meeting certain criteria, such as eligibility for use in a compliance carbon market.

Registration: Projects must pass through a series of design validation and auditing steps, including potential public comment periods, before they are approved by standards and given registered status.

Issuance: Following a project's registration, once it begins to generate emissions reductions or removals, a third-party auditor will verify that the methodology applied in the project design is being followed and confirm that the climate impact of the project is in line with expectations, allowing the standard to issue credits to the project developer.

Retirement: A credit may be passed through many hands from the project's developer, or it may be sold directly to its end user, who will "retire" the credit by requesting the standard to add the specific credit to its registry of retired credits.

Registries by Issuers – Publishing Credit Supply

Probably the most common use of "registry" in a carbon market context is to refer to the organizations that issue carbon credits and must maintain publicly available databases of carbon projects and how many credits these projects have issued and had retired. When credits change hands or are retired, account holders must inform the registry, which provides the single source of truth regarding which credits have been used as offsets. Credit issuing standards publish their registries to make credit buyers aware of existing supply and demand and planned future developments. The timely maintenance of these registries is such a major part of the function of carbon standards that the entire category of standards is sometimes referred to as "registries." Registries may be maintained directly by standards (e.g. Verra manages its own VCS registry) or by third parties (e.g., Cercarbono's registry, which is maintained by EcoRegistry).

Registries for Credit Users – Aggregating Acceptable Offsets

For end users of carbon credits who need to meet compliance requirements, another use case for a registry is to organize and track eligible credits from the VCM that can be used to offset covered emissions. This is most common when a compliance system allows credits from more than one standard for offsetting emissions. For example, the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) program allows the use of credits from six different carbon standards during the first implementation phase, and information on the credits that are retired under CORSIA is accounted for in the CORSIA Central Registry. Article 6.2 implementation also requires the establishment of national registries that contain information on credits that are traded in bilateral or multilateral transactions, and an international registry to record the transfer of these credits between jurisdictions. At COP29 in Baku last year, negotiators confirmed that countries participating in Article 6.2 will have the option to develop their own national registry, or to use the same infrastructure as the international registry to be maintained by the UN (see Box 3, Article 6 of the Paris Agreement, p 27).

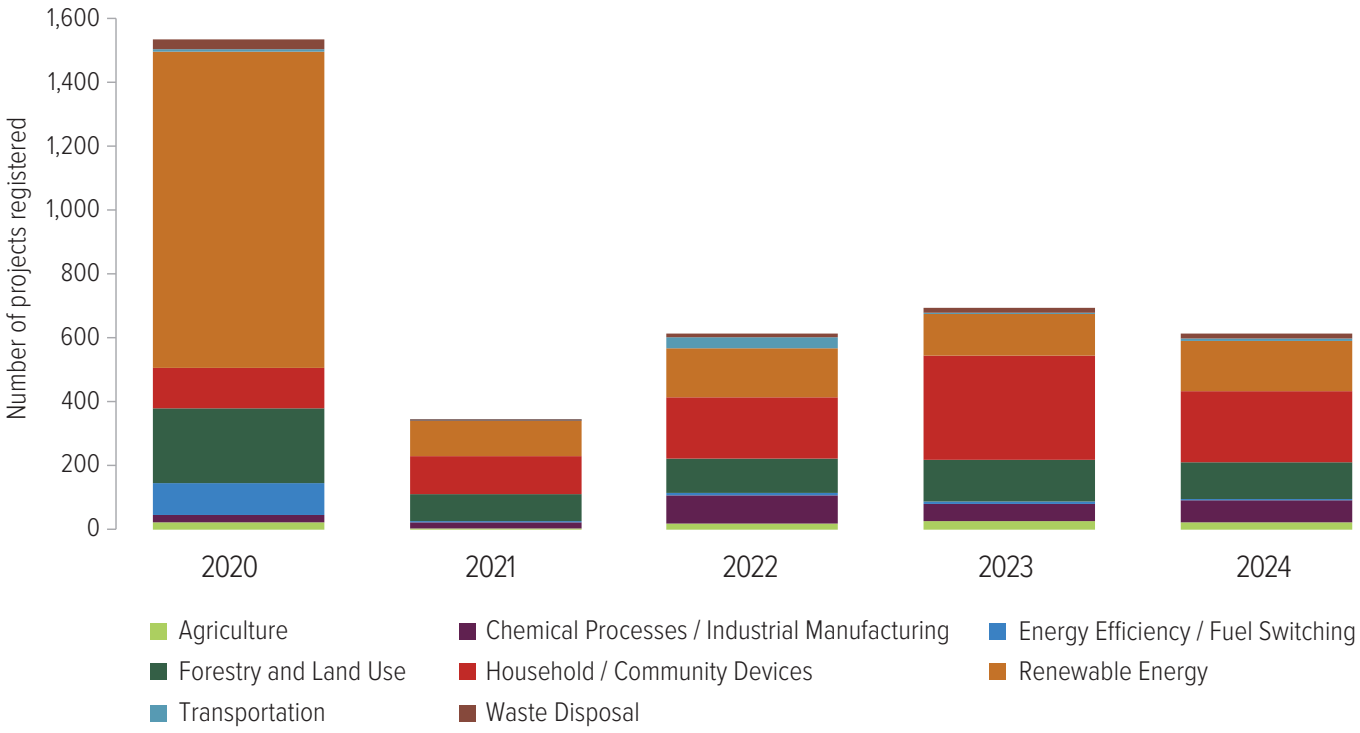
Registry Data – Project Registrations, Issuances, and Retirements

Section Insights

- Project registrations declined slightly, down 11 percent from 2023. Between 600-700 new projects have been registered with major carbon standards annually from 2022 to 2024, with categories like Household/Community devices and Agriculture gaining prevalence.
- The volume of credits issued fell 20 percent, led by declining issuances from Renewable Energy and Forestry and Land Use projects, which is expected due to the slowdown in project registrations from these categories since 2020.
- Credit retirements declined slightly to 182 million credits retired in 2024 from 189 million credits retired in 2023, which still represents a sustained increase in annual retirements since 2020 and a fairly steady rate of retirement for the last four years. Retirements of Forestry and Land Use projects held steady while Household/ Community Devices were an area of growth.
- Buyers are retiring credits from Forestry and Land Use and Agriculture projects faster than project developers can issue them, and at an accelerating pace.

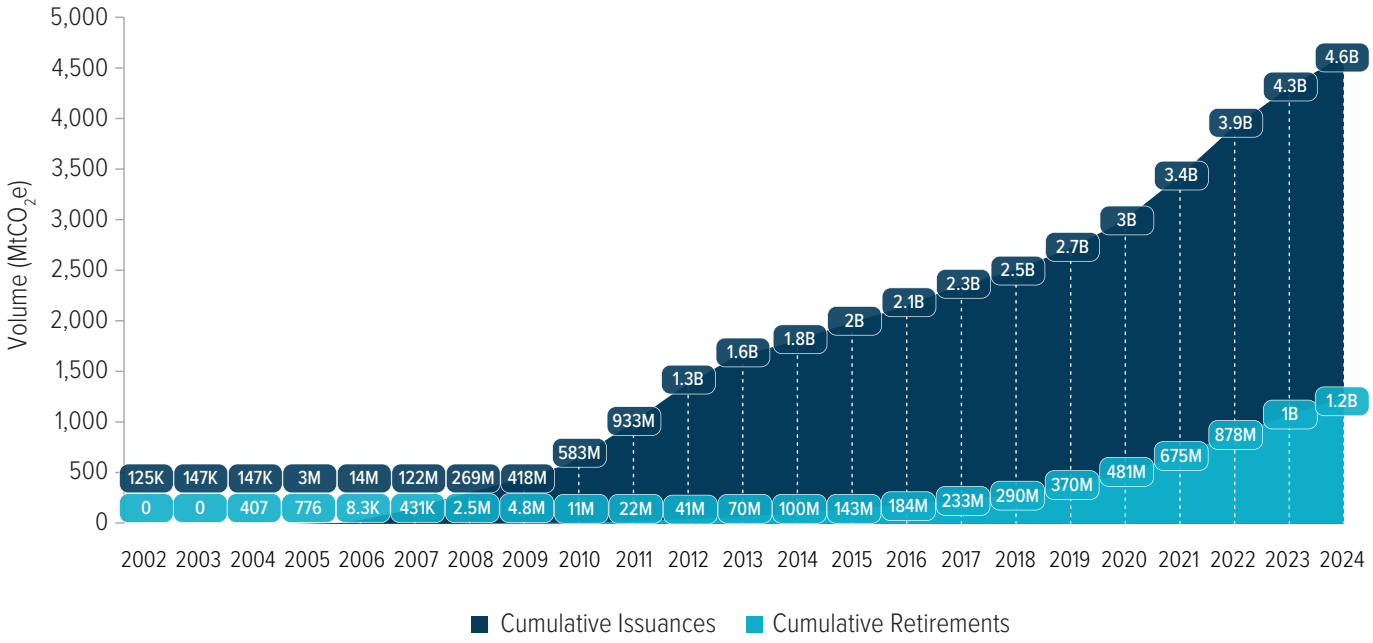
IEM transaction data tracks sales of carbon credits in terms of volumes and average prices for confirmed over-the-counter (OTC) and exchange-based trades. This allows us to provide a precise measurement of the lower bound of VCM volume and total market value for transactions that took place during a given year. Data from the project registries maintained by credit issuing standards can round out our understanding of the supply and demand of carbon credits over the course of a given year.

Figure 4. Carbon Credit Project Registrations by Category, 2020-2024



Note: This figure includes data on project registrations from ACR, ART, BioCarbon, CAR, CDM, Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and VCS registries.

Figure 5. Cumulative VCM Issuances and Retirements, 2002-2024

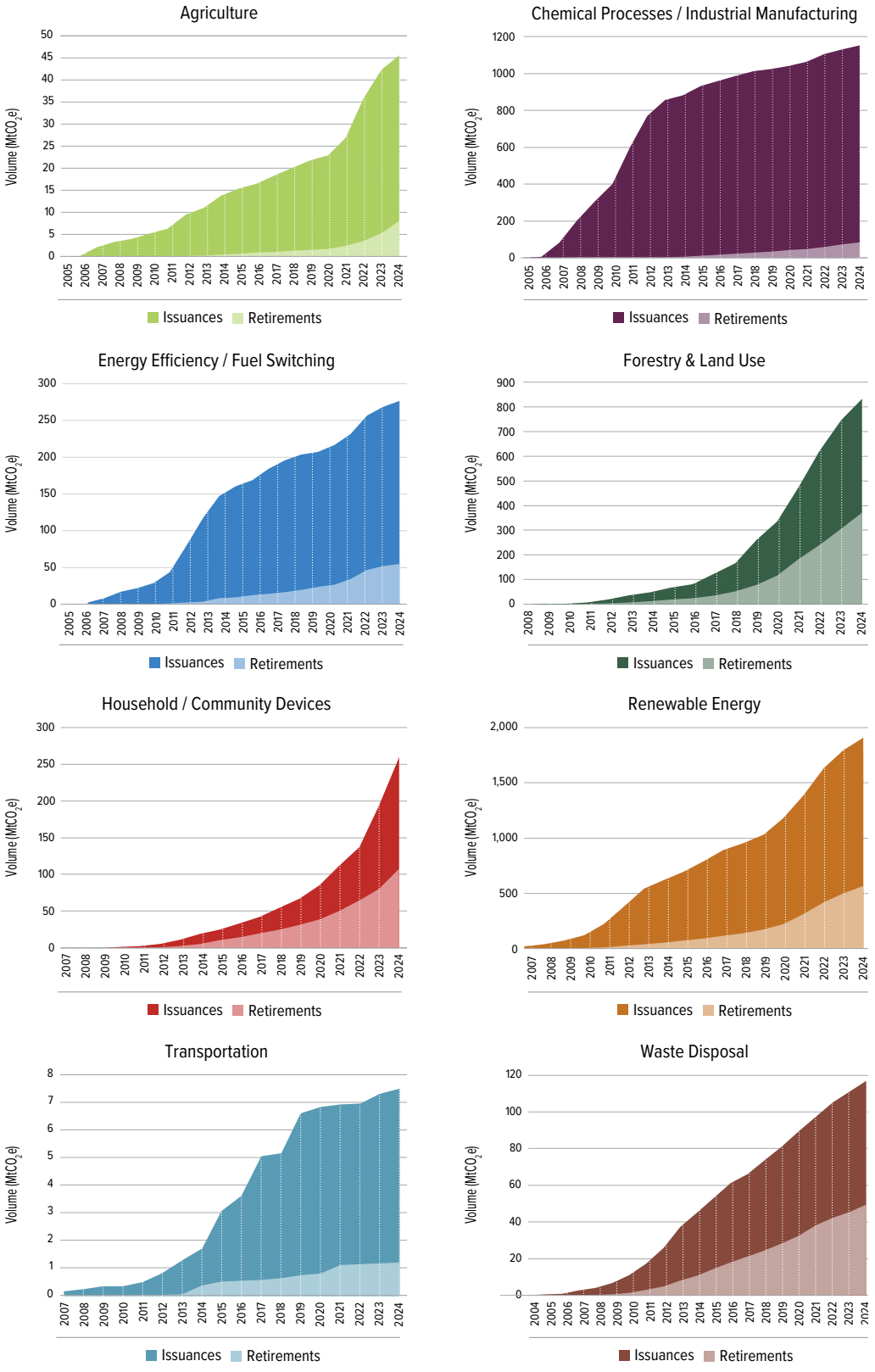


Note: This figure includes data on credit issuances and retirements from ACR, ART, BioCarbon, CAR, CDM, Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and VCS registries.

Across the ten major standards tracked by EM, 616 new carbon projects were registered in 2024, down from 694 registered in 2023, but equal to the total number of projects registered in 2022. The greatest decline in project registrations was seen in the Household/Community Devices category, which was the leading category for new project registrations in 2023 (Figure 4). Total credit issuances fell from 390 million in 2023 to 311 million in 2024 (Figure 5), with Renewable Energy and Forestry and Land Use, the largest categories, accounting for the greatest proportional decline in issuances. The Household/Community Devices category saw 9 million more credits issued in 2024 than 2023, the largest increase of any category (Figure 6). This demonstrates the long lag times from project registration to credit issuance and sales to final credit retirement. With more Household/Community Devices projects registered in 2022 and 2023, more projects completed their initial measurement, reporting, and verification (MRV) periods and sold carbon credits in 2024, and we can expect to see this delayed effect continue into the near future.

Looking at the end of the credit lifecycle, registries reported that 180 million credits were retired in 2024, down slightly from 188 million in 2023. Most categories of projects saw a decline in the volume of credits retired, including Renewable Energy, which was the most commonly retired category, with 67 million credits retired in 2024 compared to 80 million in 2023. Forestry and Land Use and Transportation credit retirements held steady at 66 million credits and 33 million credits retired in 2024, respectively. Household and Community Devices credits saw the greatest growth in retirement volume in 2024 with 68 million credits retired, and Waste Disposal and Agriculture credits were also retired in higher numbers over the past year with 4 million credits retired. In Agriculture, the smallest category in terms of credit issuances and retirements, retirement volume grew by 60 percent over the last year with nearly 3 million credits retired (Table 2).

Figure 6. Cumulative VCM Issuances and Retirements by Project Category, 2002-2024



Note: This figure includes data on credit issuances and retirements from ACR, ART, BioCarbon, CAR, CDM, Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and VCS registries.

Table 2. Volume of Credit Retirements ($MtCO_2e$) by Category, 2020-2024

Project Category	2020	2021	2022	2023	2024
Agriculture	0.2	0.7	1.1	1.8	2.8
Chemical Processes/ Industrial Manufacturing	8.4	7.0	10.5	15.4	9.6
Energy Efficiency/Fuel Switching	3.1	7.4	12.3	5.7	2.8
Forestry & Land Use	39.0	67.6	56.8	67.4	67.8
Household/Community Devices	7.5	11.5	14.1	16.0	27.5
Renewable Energy	48.7	92.7	104.4	79.9	67.0
Transportation	0.06	0.3	0.03	0.03	0.03
Waste Disposal	4.5	5.5	4.2	3.2	4.0
Total	111.6	192.6	203.4	189.4	181.5

Note: This table includes data on credit issuances and retirements from ACR, ART, BioCarbon, CAR, CDM, Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and VCS registries.

Volume, Value, and Price by Project Attributes

Project Category and Type

Section Insights

- Forestry and Land Use transaction volume fell less than one percent, and the market share of transactions from this category continues to grow.
- The volume of Waste Disposal credits traded increased by more than 3X, driven by buyer demand for Landfill Gas credits following CCP approval in mid-2024.
- The only category with increased prices was Agriculture, which saw an 18 percent increase in average price driven by increased prices across all major clusters, including Livestock Methane, Sustainable Agricultural Land Management, and Soil Carbon.
- VCM market structure reflects sustained buyer appetite for credits that sell at average or above average prices, as well as residual demand for the large supply of older credits trading below average price.

As was the case over the last two years of VCM activity, different project categories continued to have differing trajectories over the course of 2024, which was also highlighted in the last two State of the VCM reports. Most categories saw a decline in transaction volume and total value; however, the volume of credit transactions for the Waste Disposal category more than tripled from 2023, and the total value of this market segment grew nearly as much, becoming the fifth-largest category by volume and the fourth-most valuable in 2024 (Table 3). This growth is due to increased demand for credits from ICVCM's CCP-approved Landfill Gas projects, which is an early example of how decisions made by VCM integrity initiatives can impact market demand for a specific credit type.

Other categories of carbon projects saw a decline in transaction volume. The Renewable Energy category, which contributed the largest share of transactions as recently as 2020, continued to contract, with volumes falling by 23 percent and average price declining by 31 percent. The only type of Renewable Energy project that saw

Table 3. VCM Transaction Volumes, Values, and Prices by Project Category, 2023-2024

	2023			2024			Percent Change		
CATEGORY	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume	Value	Price
Forestry and Land Use	37.1	$372.3M	10.04	37.0	$342.5M	9.27	0%	-8%	-8%
Renewable Energy	29.0	$113.5M	3.92	22.3	$59.5M	2.67	-23%	-48%	-32%
Chemical Processes / Industrial Manufacturing	12.2	$50.2M	4.10	5.7	$20.8M	3.66	-53%	-58%	-11%
Household / Community Devices	10.2	$78.3M	7.71	5.1	$37.4M	7.30	-50%	-52%	-5%
Waste Disposal	1.5	$10.9M	7.46	4.8	$32.0M	6.72	226%	193%	-10%
Agriculture	4.7	$30.7M	6.51	0.6	$4.7M	7.66	-87%	-85%	18%
Energy Efficiency / Fuel Switching	9.4	$34.4M	3.65	0.6	$1.9M	3.05	-93%	-95%	-16%
Transportation	-	-	-	0.2	$0.6M	3.24	-	-	-

Note: EM cannot report an average price for Transportation credits in 2023 because of the confidentiality of individual EM Respondent data.

Table 4. VCM Transaction Volumes, Values, and Prices by Forestry and Land Use Project Types, 2023-2024

	2023			2024			Percent Change		
Project Cluster	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume	Value	Price
REDD+	28.2	$222.3M	$7.87	13.6	$82.1M	$6.03	-52%	-63%	-23%
Improved Forest Management (IFM)	2.6	$41.9M	$16.2	8.8	$132.3M	$14.97	242%	216%	-8%
Afforestation-Reforestation and Revegetation (ARR)	4.8	$82.4M	$17.15	3.8	$77.7M	$20.44	-21%	-6%	19%
Agroforestry	0.7	$8.1M	$11.58	0.6	$8.3M	$14.11	-17%	1%	22%
Blue Carbon	0.4	$3.2M	$8.33	0.2	$5.2M	$29.72	-54%	64%	257%

prices increase in 2024 was the Biogas cluster, which includes Landfill Gas to Energy projects that may be eligible for CCP approval. The volume of credits traded in the Chemical Processes/ Industrial Manufacturing and Household/ Community Devices categories both fell by half from 2023 to 2024 (Table 3). In the case of Household/Community Devices, a large volume of credits traded in 2023 came from a single project developer issuing Cookstove Distribution credits which ceased operations in the first half of 2024. This illustrates how consolidation within VCM sectors can influence annual transaction volume.

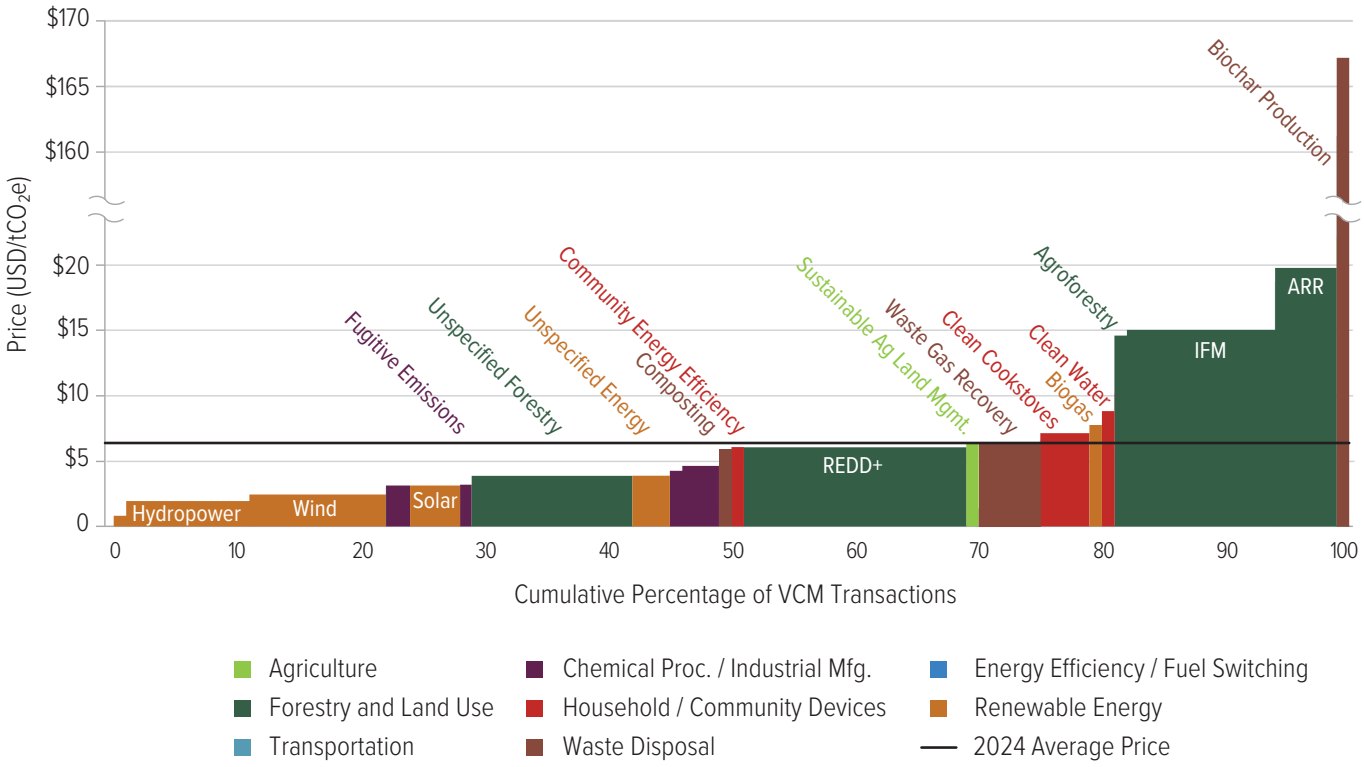
Agriculture was the only category of credits that saw an increase in average price in 2024, which was driven by price increases across most clusters. Despite this, the transaction volume for credits from this category fell by 87 percent.

A category that contracted in both volume and value was Energy Efficiency/Fuel Switching, where reported transaction volume fell by 93 percent from 2023. These credits are becoming more niche and liquidity is decreasing as credit buyers demand more evidence of project additionality.

The volume of credits traded from Forestry and Land Use projects remained more or less the same at 37 $MtCO_2e$, while the average price fell 8 percent from 2023, leaving prices sustained above $\$9/tCO_2e$. Within this category, credits from REDD+ projects continued to lose market share and value, with transaction volume declining by half and the average price for REDD+ credits falling by 23 percent. IFM credits were a sign of growth within the Forestry and Land Use category, with more than three times as many transactions reported in 2024 than in 2023. Credits from nature-based projects providing removal credits also grew in value within the category, with the average price of ARR, Agroforestry, and Blue Carbon credits increasing by 19 percent, 22 percent, and 257 percent, respectively (Table 3).

Taking a broad view of the supply and demand for credits available in the VCM in 2024, it is clear that there are multiple segments of projects that continue to grow and can drive overall market value in the future, even as some legacy credit types continue to fall by the wayside. About half the volume of credits sold in the VCM traded below the average price of $\$6.37/tCO_2e$ in 2024, mainly from less additional Renewable Energy methodologies and older Forestry and Land Use projects. The next quartile of demand was met by credits trading at around the current average price, including REDD+ credits, Sustainable Agricultural Land Management, and Waste Gas Recovery, the cluster encompassing Landfill Gas projects. The remaining quartile of transaction volume was from project clusters that traded above the market price, on average. Most of this volume came from IFM, ARR, clean cooking and water purification Household/Community Devices projects, and Renewable Energy Biogas

Figure 7. VCM Credit Cost Curve, 2024 Transactions



Note: Average cluster prices are indicated. Individual credit prices vary within a cluster depending on many factors, including discounts for large transactions and price differentials for project quality. Only includes clusters with transaction data sourced from at least three Respondents, in keeping with EM's confidentiality policy.

projects. The most expensive credit type was engineered removal credits like the Biochar Production, which had an average price of over $165/tCO$_2$e but made up less than one percent of the transactions reported to EM in 2024 (Figure 7).

As expectations of quality continue to ratchet up in voluntary and compliance carbon markets, it is likely that the project types making up this top 25 percent of credits indicate the multiple directions that the VCM was pulled in 2024: high quality Forestry and Land Use and Household/Community Devices projects that can drive reductions and removals at high scale in the present moment, as well as cutting-edge methodologies that are establishing a nascent market for engineered carbon removals. Ultimately, the wide price range in the VCM in 2024 demonstrates the spectrum of choice buyers have in the market, governed by their individual needs and value judgments.

Details of Project Categories

AGRICULTURE

2024 EM Data Represent:
19 projects 8 types 8 standards 8 countries

Projects in the Agriculture category focus on reducing emissions from agricultural activities in farmland and pasture. This economic sector is responsible for over one-tenth of global greenhouse gas emissions annually. Project types addressing agricultural emissions include livestock methane mitigation projects, such as farm-scale biodigesters for generating energy from manure, and sustainable land management projects on farmland and grasslands, which reduce emissions from agricultural activities and can store carbon from the atmosphere in

the form of soil carbon. Average prices in this category increased from 2023, driven by credits from several project types, including livestock methane projects (the most widely traded credit type), avoided grassland conversion, and soil carbon. While credits from VCS were once again the most widely traded credits from this category, the share of total transaction volume for VCS fell to 42 percent, with Gold Standard the second-most traded standard for this category. The most common region of origin for Agriculture credits in 2024 was Asia, making up 38 percent of transaction volume, followed by Africa with 21 percent of volume traded.

CHEMICAL PROCESSES/ INDUSTRIAL MANUFACTURING

2024 EM Data Represent:
14 projects 14 types 5 standards 7 countries

The Chemical Processes/Industrial Manufacturing category remained the third-largest category in terms of transaction volume in 2024, although the Household/Community Devices and Waste Disposal categories had a greater total value. These projects reduce greenhouse gases emitted in industrial settings, whether those emissions come through direct production or utilization as chemical reagents. Common project types include nitrous oxide destruction, hydrofluorocarbon reclamation, fugitive emissions capture and destruction, and other ozone depleting gas destruction projects. Direct air capture (DAC) and other engineered removals methodologies are included in this category, as well. The approval of fugitive emissions and ozone depleting substances (ODS) under ICVCM's CCPs increased transaction volume for these clusters, but ultimately category volume was down year-over-year due to reduced transactions of nitrous oxide destruction credits, the largest project cluster in the category. The plurality of credits traded in 2024 came from the American Carbon Registry (ACR), representing 46 percent of transaction volume, followed by VCS at 16 percent of volume. North America was the main source of credits traded, with 44 percent of volume originating from North American projects, followed by 5 percent from Asia.

ENERGY EFFICIENCY/ FUEL SWITCHING

2024 EM Data Represent:
5 projects 8 types 5 standards 15 countries[1]

Energy Efficiency/Fuel Switching projects address greenhouse gas emissions at the source of demand, either by increasing the efficient use of power and heat in industrial and residential settings or by changing fossil fuels used in power generation to fuels like biomass and natural gas that have less global warming impact. Transaction volumes in 2024 were down across all project clusters, including industrial energy efficiency, utility grid efficiency, and fuel switching. In 2024, 58 percent of Energy Efficiency transaction volume reported to EM originated from Asia, and 96 percent of credits were from VCS projects.

FORESTRY AND LAND USE

2024 EM Data Represent:
151 projects 20 types 15 standards 36 countries

Market share for the Forestry and Land Use category continues to grow, with transaction volume declining less than one percent from 2023 to 2024. Credits from REDD+ projects remain the most-traded credit type, at 37 percent of total category volume, despite declining volume for this project type in 2024. However, the volume of credits traded from IFM projects more than tripled in the last year, with much of the supply sourced from North America. Meanwhile, ARR credit volume declined 21 percent with price increasing 19 percent. Projects located in Latin America and the Caribbean contributed 27 percent of transaction volume in the last year, followed by North America (22 percent), Africa (nine percent), and Asia (eight percent). The largest standard, in terms of credit

[1] 2024 data include more project types and countries than the number of projects reported because not all Respondents provided project ID information for every transaction reported.

transaction volume, was VCS, at 57 percent of Forestry and Land Use volume, followed by ACR with 20 percent, and Plan Vivo with 3 percent of reported volume. This category remains relevant across the VCM value spectrum, with the largest transaction volume and market value in 2024, as well as the greatest number of projects, project types, standards, and countries represented in reported transaction data.

HOUSEHOLD/ COMMUNITY DEVICES

2024 EM Data Represent:
61 projects 8 types 3 standards 28 countries

The Household/Community Devices category focuses on energy demand at the level of individual households and communities, often in rural locations with limited infrastructure. Project types in this category can include efficient cookstove distribution, water purification device distribution, community biogas and biodigester infrastructure, and community-scale renewable energy and energy efficiency projects. Household/Community Devices credits from Gold Standard were the most widely traded in 2024, at 71 percent of transaction volume, followed by eight percent of volume from VCS. Africa was the biggest source of Household/ Community Devices credits traded last year, at 43 percent of credits, followed by Asia, where 20 percent of credits traded originated.

RENEWABLE ENERGY

2024 EM Data Represent:
113 projects 19 types 8 standards 23 countries

Credits traded from the Renewable Energy category had the second highest transaction volume and second greatest total market value, after Forestry and Land Use, as well as the second most projects represented in EM data. Leading project clusters in this category included wind, hydropower, solar, biomass, and biogas. While average transaction prices in this category continued to fall in 2024, the average price for biogas credits rose, which may relate to ICVCM's approval of landfill gas to energy projects under the CCPs. Latin America and the Caribbean was the origin for 21 percent of credits traded in 2024, just above Asia at 19 percent. The continued decline in Asian Renewable Energy market value, especially for credits from CDM projects, drove declines in both Renewable Energy and the Asia region as a whole. The most prevalent standard for Renewable Energy credits was VCS, at 48 percent of transaction volume, followed by CDM, which still accounts for 26 percent of transaction volume in this category, and Gold Standard, which was the issuer of 20 percent of credits traded.

TRANSPORTATION

2024 EM Data Represent:
3 project 4 types 3 standards 1 country

The Transportation category is typically the smallest category in terms of transaction volume because so few Transportation projects have been registered. These projects focus on increasing the efficiency of transportation by developing new mass transit and supporting electric vehicle adoption and human-powered transport. In 2024, the greatest volume of transactions for Transportation credits was from projects that focus on increasing the efficiency of shipping fleets. All reported sales of Transportation credits were from North American projects, with 82 percent of these transactions for Canadian Standards Association credits.

WASTE DISPOSAL

2023 EM data consist of:
12 projects 7 types 9 standards 11 countries

Waste Disposal was the only category with increased transaction volume and market value in 2024, with volume more than tripling from 2023. However, average credit prices fell by ten percent, driven by a decline in the market value of credits from recycling projects. Landfill gas destruction credits were the main driver of growth in this

category after ICVCM approved ACR, Climate Action Reserve (CAR), Gold Standard, and VCS landfill gas credits under their CCP assessment framework in July 2024, with transaction volume for this project type increasing 149 percent from 2023. Composting credits also saw notable growth in demand in 2024, with transaction volume increasing to over 7 times the volume traded in 2023. The majority of credits traded (55 percent) were from projects in North America, with the largest standards by transaction volume being CAR (42 percent) and VCS (30 percent).

Project Standard

Section Insights

- The decline in average credit price across the total market is driven by two standards: VCS (price decreased 33 percent) and CDM (price decreased 49 percent).
- VCS maintained the largest market share in 2024, once again making up about 50 percent of the total market, while ACR became the second largest standard by volume traded.
- The average price of ACR credits doubled in 2024, while the total value of credits traded from projects registered by CAR grew by 23 percent, both driven by sales of CCP-approved Landfill Gas and Ozone Depleting Substances credits.

Credits sourced from projects registered by different standards saw notable differences in transaction volume and price trajectories in 2024. The market share of the largest standard, VCS, remained steady at about 50 percent of the total VCM, though the average price of VCS credits fell by 33 percent. Average prices also fell for credits from projects developed under the UN's CDM, driving a 54 percent decline in total value despite transaction volume decreasing only 10 percent (Table 5). While the CDM is a last-generation standard for credits developed under the Kyoto Protocol, credit transactions have continued while some projects are pending approval for transition to the Paris Agreement Credit Mechanism (PACM), the new standard for credits developed under Article 6.4 of the Paris Agreement (see Box 3).

For all other credit issuing standards, average credit price increased from 2023 to 2024. The volume of credits from ACR traded held steady in 2024, declining only 5 percent from the year before. This relatively low decrease in transaction volume while average credit price doubled from 2023 led ACR to become the second-largest standard in terms of both transaction volume and total value. The approval of ACR Landfill Gas and ODS credits under ICVCM's CCPs was one factor in this standard's growing market share. The total value of credits traded from projects registered by CAR grew by 23 percent, which was also influenced by the approval of Landfill Gas and ODS projects from CAR under the CCP label (Table 5).

Project Location

Section Insights

- Falling market value in 2024 was largely driven by the decline in both the volume and average price of credits from projects in Asia, especially Renewable Energy credits, which are considered lower quality.
- North American credit prices increased by 59 percent, driven by demand for CCP-approved credits and expensive IFM credits.

Examining the relative volume and value of credit transactions by the region where the credit originated provides a more in-depth look at how the supply and demand for VCM credits shifted in 2024. The total reported value of transactions for credits originating from projects in Asia fell by 57 percent, driven by a 20 percent decline in price (Table 6). This regional downturn was driven by declining prices for Asian carbon credits from almost all categories, especially Renewable Energy. The only exceptions were the Forestry and Land Use category, where prices remained more or less unchanged, and the Household/Community Devices Category, where average credit prices increased in 2024.

Other regions saw similar declines in reported transaction volume, but increasing average credit prices partially or fully offset the decline in market value. In Latin America and the Caribbean, the largest region of origin for credits

traded in 2024, volume fell 37 percent but prices rose 17 percent. This was driven by increasing prices for Household/Community Devices credits. In Africa, volumes similarly fell 48 percent while average price increased 26 percent. This was driven by increasing prices for Forestry and Land Use credits from this region, while Household/Community Devices credits had little price change year-over-year.

Regions in the Global North saw increases in reported market value from 2024 transaction data collected by EM. In North America, a 59 percent increase in average credit price was due to an increase in the transaction volume of relatively expensive Forestry and Land Use and Waste Disposal credits, which grew by 600 and 500 percent from 2023, respectively. At the same time, the volume of Energy Efficiency/Fuel

Table 5. VCM Transaction Volumes, Values, and Prices by Project Standard, 2023-2024

	2023			2024			Percent Change		
Standard	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume	Value	Price
VCS	56.6	$394.1M	$6.96	41.9	$194.8M	$4.65	-26%	-51%	-33%
ACR	10.8	$61.7M	$5.74	10.3	$121.4M	$11.82	-5%	97%	106%
Gold Standard	16.3	$103.9M	$6.37	9.8	$69.5M	$7.10	-40%	-33%	11%
CDM	6.9	$18.0M	$2.63	6.2	$8.3M	$1.35	-10%	-54%	-49%
CAR	3.4	$26.5M	$7.80	3.1	$32.5M	$10.60	-10%	23%	36%
Plan Vivo	1.6	$18.8M	$11.51	1	$12.8M	$13.14	-40%	-32%	14%
UK Woodland Carbon Code	0.3	$10.5M	$30.25	0.3	$9.5M	$34.18	-20%	-9%	13%
Canadian Standards Association	-	-	-	0.3	$1.7M	$6.62	-	-	-
Cercarbono	0.6	$2.4M	$4.17	0.2	$0.9M	$4.25	-64%	-63%	2%

Note: EM cannot report an average price for credits from Canadian Standards Association projects in 2023 because of the confidentiality of individual EM respondent data.

Table 6. VCM Transaction Volumes, Values, and Prices by Project Region, 2023-2024

	2023			2024			Percent Change		
Region	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume	Value	Price
Latin America and Caribbean	23.2	$129.0M	$5.56	14.6	$95.1M	$6.52	-37%	-26%	17%
North America	20.8	$150.5M	$7.24	13.6	$157.1M	$11.52	-34%	4%	59%
Asia	17.1	$123.2M	$7.19	9.2	$53.1M	$5.74	-46%	-57%	-20%
Africa	13.8	$82.5M	$5.98	7.2	$54.5M	$7.53	-48%	-34%	26%
Europe	0.5	$13.3M	$27.17	0.7	$19.0M	$29.19	33%	43%	7%
Oceania	0.06	$1.8M	$32.17	-	-	-	-	-	-

Note: EM cannot report an average price for credits from Oceania in 2024 because of the confidentiality of individual EM respondent data.

Switching credits traded fell by over 99 percent, but average price more than doubled, which indicates a shift away from lower quality Energy Efficiency credits in North America.

Europe was the only region to see reported transaction volume grow, by 33 percent. However, as Europe is one of the smallest regions in terms of credit origination, the 43 percent increase in European market value was equivalent to the 4 percent increase in North American market value (Table 6). The growth in reported market value for these regions does not make up for declining values from Asia, Africa, and Latin America. The increased average price of credits from European projects was related to a growing volume of reported transactions with expensive Forestry and Land Use credits and several extremely expensive transactions of Biochar Production projects in the Waste Disposal category, which was the most expensive type of credit in 2024.

Box 2. Voluntary and Compliance Carbon Markets

Historically, voluntary and compliance carbon markets were thought of as separate, but it is now more accurate to recognize the interdependence and interoperability of the VCM and compliance markets. The majority of carbon credits are generated by voluntary project developers, while both compliance demand and voluntary demand from companies, institutions, and individuals have represented parallel tracks for credits to flow to end users. An increasing number of compliance carbon markets, whether emissions trading schemes (ETS) or carbon tax systems, now allow the use of some credits from voluntary standards to offset regulated emissions.

The major distinction between the VCM and compliance markets is the intended use of carbon credits. In the VCM, use of credits for offsetting is the main alternative to decarbonization for end users, while in compliance markets, regulated parties can either trade emissions allowances with other compliance participants or pay a tax on emissions exceeding set allowances. In both cases, market regulators and end users make choices about which credits to transact, with embedded value judgments about which credits represent the greatest assurance and highest overall quality of emissions reductions or removals.

The Voluntary Carbon Market

The VCM is the sum total of all carbon credits originating from voluntary carbon standards and being used by a group of voluntary credit buyers composed of companies, institutions, and individuals who wish to offset some or all of their annual emissions. Many carbon credits are sold to intermediaries and aggregators who sell voluntarily generated credits to both voluntary and compliance buyers. Because intermediaries sell to both types of buyers, price action, supply, and demand in the VCM can affect compliance markets through this linkage, and vice versa.

End users in the VCM can choose one of two approaches to buying and using carbon credits for emissions offsetting. They may choose to follow the guidance of a framework, like the Science Based Targets Initiative (SBTi) Net-zero Standard or the Voluntary Carbon Market Integrity Initiative's (VCMI) Claims Code of Practice, or they may decide to buy and retire carbon credits in any quantity and from any project type to meet specific objectives. Credit buyers who retire credits outside of or in addition to one of these frameworks make their own judgments about what types of credits fit their objectives for impact through the VCM and about the best philosophy for high impact credit purchases. They may choose to invest in certain project types for their non-carbon co-benefits, or they may seek out the lowest prices on high quality carbon credits to maximize the impact of their capital on greenhouse gas emissions. However, these buyers must be prepared to define and explain their decisions to invest in credits to stakeholders, customers, and sometimes media, without the benefit of an outside framework to explain their rationale.

Compliance Markets and Carbon Credits

In most compliance carbon markets, the main objective of the market is to incentivize businesses to decarbonize using trading of emissions allowances (in ETS) or taxing excess emissions, while project-based carbon credits are meant to be a minor feature. *(continued)*

Box 2. Voluntary and Compliance Carbon Markets *(Continued)*

One exception to this trend is the nascent market for international carbon credit trading being operationalized under Article 6 of the Paris Agreement (see Box 3, p 27). The objective of Article 6, including the 6.2 and 6.4 market mechanisms, is for high-emitting countries to meet their Nationally Determined Contributions (NDCs) goals, negotiated under the Paris Agreement. This will be achieved by purchasing credits from projects in countries which are on track to keep their emissions below their NDCs or have a surplus supply of credits beyond their countries need.

Compliance markets in individual jurisdictions and industries are beginning to embrace interoperability with the VCM, indicating acceptance of the common framework of emissions reductions and removals underlying both types of carbon market. While some compliance markets have internal projects that generate carbon credits only to be used within the compliance system, the vast majority of credits traded are sourced from voluntary project developers using a standard like ACR, Gold Standard, or VCS. These standards have no specific compliance demand in mind when establishing a project.

The decision to accept voluntary credits into a compliance scheme is therefore a complex value judgment that requires making decisions about which type of credits to incentivize end users to engage with, and in what quantity. Compliance markets may limit the amount of covered emissions that can be offset using carbon credits, as in California and Washington state. Another lever that compliance markets use to control the use of voluntary credits is to limit the variety of voluntary project types that are eligible for compliance offsetting. No matter the approach taken, policymakers should be confident in their ability to explain how the use of voluntary credits helps achieve decarbonization goals.

Buyer Preferences and Proxies for Quality

Reductions, Removals, Nature-based, and Engineered Credits

Section Insights

- Buyers showed a strong preference for removal credits, increasing the average price of these credits in 2024 and pushing the premium for removals over reductions up to 381 percent.
- Because the vast majority of removal credits available today are from ARR projects, this demand for removals has prevented larger declines in the value of the Forestry and Land Use category.

One of the key trends in the VCM in 2024 was buyers' continued demand for credits that represent removals of carbon dioxide from the atmosphere, rather than reductions of greenhouse gas emissions, which were perceived as lower quality credits. While both reductions and removals are essential for slowing global warming, only removals can compensate for "residual emissions" from hard-to-decarbonize industries, like steelmaking. These removal credits will be critical to achieving global net-zero emissions.

Despite full net-zero emissions being decades away from feasibility, there are some buyers who are specifically seeking removal credits. In particular, large tech companies have emerged as a leading source of demand for removals, as data center operations are a rapidly growing source of greenhouse gas emissions and large tech companies have taken a more stringent approach to what they consider quality credits. In many cases, buyers of removal credits have placed the durability of storage for the drawn down carbon at the forefront of their strategy, demanding 100- or 1,000-year durability timelines to establish "permanent" carbon removal. This has led some buyers to dismiss nature-based removal types, such as ARR, even though properly planned nature-based removals can have greater than 100 years of durability and technological removals are not without reversal risks of their own.

Although there is a clear demand signal for removal credits, growth in supply has lagged, creating higher prices for credits from this market segment. The average price of a removal credit increased by 13 percent in 2024. As a result, the average price premium for removals over reductions grew to 381 percent in 2024, up from 245 percent in 2023 (Table 7). The market share of removals grew, but remained small in absolute terms, with five percent of total transaction volume coming from removal credits in 2024, compared to four percent in 2023.

Removal credits can be sourced from projects that create removals only, including nature-based ARR and Agroforestry projects, as well as technological removals, like direct air capture (DAC), biochar production, and novel technologies such as biomass sequestration and marine carbon capture. Removals can also come from nature-based projects, which produce credits representing both reductions (from land use changes that decrease greenhouse gas emissions) and removals (from increased carbon stored in biomass and soil carbon pools). Project types producing these credits include some ARR, IFM, and REDD+ projects, Blue Carbon projects including Mangrove Restoration, and Agriculture projects that increase soil carbon stocks. The average price of credits representing both reductions and removals also increased in 2024, with prices 15 percent higher than the year before (Table 7).

Although there are many new technological removal methodologies on the near horizon, ARR remains the largest source of pure removals, representing 99 percent of transaction volume for these credits over the last year. ARR not

Table 7. Volume, Value, Price for Reduction vs. Removal Credits

	2023			2024		
	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)
Removals	4.9	$84 .0M	17.28	4.2	$82.2M	19.50
Reductions	58.6	$271.5M	4.64	38.8	$157.5M	4.05
Both	35.4	$297.3M	8.40	22.8	$221.7M	9.73

only accounts for the largest volume of removal credits, but these credits are also on average ten times less expensive than credits from novel engineered project types.

Demand for removals was a major theme in both our quantitative and qualitative findings, with 24 percent of Respondents who completed our sentiment survey mentioning buyer demand for removals in their responses (see EM Respondent Sentiments on the VCM in 2024, p 29). The expressed preference for removals served to bolster sales of nature-based credits (defined as all credits from projects in the Forestry and Land Use and Agriculture categories) over the last year. The volume and total market value of the nature-based segment of the VCM fell proportionally less than the larger volume of engineered credits; as a result, nature-based credits made up 45 percent of total transaction volume in 2024, up from 37 percent a year earlier.

Co-benefit Certifications

Section Insights

- Many of the objectives of co-benefit certification programs are becoming embedded in the structure of the VCM, including strong local environmental and social benefits.
- The advent of ICVCM's CCPs has decreased the urgent need for separate co-benefit certifications. Only one Respondent from EM's market sentiment survey mentioned co-benefits in their response, while 35 percent mentioned ICVCM and CCPs.

Over the past several years, we have noted a preference among VCM credit buyers for credits generated from projects that provide environmental and social co-benefits beyond mere carbon reductions and/or removals. In the past, these projects were largely distinguished by participation in additional co-benefit certification programs, which were either organized by credit-issuing standards (e.g., Verra's Climate, Community, and Biodiversity (CCB) and SD VISta labels) or through independent bodies (e.g., Social Carbon). However, the scope of these programs has always been limited – CCB only applies to Forestry and Land Use project types and covers slightly less than half of the total volume issued in that category to date, and Social Carbon has transitioned to an impact-focused credit issuing standard rather than an independent label.

Project certification indicating alignment with one or more UN Sustainable Development Goals (SDGs) is another possible way to indicate social and/or environmental co-benefits. This is typically data applied at the registry level by standards, and some standards may require a minimum number of certified SDGs before accepting a project for registration. However, as of 2024, EM has only been able to directly source information on SDG certification status for ACR, CAR, Gold Standard, and Plan Vivo, and from six VCS projects, meaning that our ability to determine project co-benefits from SDG certifications remains incomplete. In 2024, the premium for credits with at least one SDG certification grew to 71 percent, compared to 29 percent the year before.

Many of the objectives of co-benefit certifications are becoming embedded in the structure of the VCM. The relatively high prices and stable transaction and retirement volumes for Forestry

and Land Use credits reflect not only demand for these credits, but also additional premiums on projects that restore and conserve natural landscapes and provide habitat for biodiversity and other crucial ecosystem services. The growth of the Household/Community Devices category through 2023 (and the continued growth in retirements of these credits) can be explained through demand for credits from projects that directly benefit the local communities where they are located.

The shift away from distinct co-benefit certifications is evident in responses to our qualitative sentiment survey (see EM Respondent Sentiments on the VCM in 2024, p 29). No Respondents mentioned SDG certification, and only one Respondent mentioned CCB certification in their response to the unstructured questions in our survey, compared to 36 percent who mentioned ICVCM and CCP approval. Therefore, it appears that while buyer preference and demand for projects that include environmental and social co-benefits remains strong, the market has not coalesced around a way to determine or track these benefits.

Credit Vintage

Section Insights

- The recency premium for credits with a vintage from the last five years grew to 217 percent in 2024, a large increase from 2023.
- Buyers increasingly prefer to align the vintage of credits used for offsetting with the years of emissions being offset, and seeking newer credits also avoids outdated methodologies.

Credit buyers continue to demonstrate a strong preference for credits from a vintage within five years of the date of sale. In fact, the average price of credits that were generated in the last five years grew 17 percent in 2024, in contrast to the price of older credits, which fell by an average of 43 percent. The premium for credits generated in the last five years, already at 53 percent in 2023, grew to an incredible 217 percent last year, with buyers paying over three times as much for more recent credits (Table 8).

Although there has been no strong guidance from market integrity groups such as ICVCM or the Voluntary Carbon Market Integrity Initiative (VCMI) regarding credit vintage, there are several reasons that buyers might prefer to source credits with a vintage within the last five years. As a practical matter, buyers often prefer to purchase credits from the current calendar year to offset greenhouse gas emissions in the same year; however, due to the MRV cycles for many project types, large volumes of credits are not issued until one or two years after their vintage date. End users of credits may also hold credits for the future instead of retiring in the current year, and if they choose this strategy, they may wish to compensate for the later retirement date by buying the most recent credits available on the market.

Another factor that may increasingly contribute to the premium for credits from more recent vintages is the continuing improvement of project methodologies and the evolution of quality standards as the VCM matures, particularly the expanding scope of ICVCM's CCP assessments on project types and specific methodologies. By establishing an acceptable version of a project methodology, such as CAR's US Landfill Protocol in the Landfill Gas type, ICVCM creates a cutoff date for credit vintage, as credits issued under earlier versions of these methodologies will not be given CCP-approved status. In some cases, credit issuing standards are creating new, consolidated methodologies for project types like REDD+ and ARR, and older methodologies are not under assessment by ICVCM.

Table 8. Vintage and Recency Premium

Year	Older than 5 years (USD)	More recent than 5 years (USD)	Recency premium
2020	2.41	3.53	47%
2021	3.69	5.09	38%
2022	5.56	8.59	55%
2023	5.17	7.91	53%
2024	2.94	9.31	217%

CORSIA and Compliance Markets

Section Insights

- CORSIA, one of the first compliance carbon schemes to include a pathway for carbon credit supply from voluntary carbon standards, entered into its first compliance phase in 2024, with credits from a new set of standards and project types approved for use as offsets.
- CORSIA eligibility is still an important driver of demand for some credit types but from the perspectives of market participants, integrity initiatives, such as ICVCM's Core Carbon Principles, are becoming a more relevant indicator of credit quality for most credit buyers.

Beginning in 2021, the International Civil Aviation Organization's (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) program was viewed as an important indicator for carbon credit quality requirements in compliance markets. CORSIA requires airlines flying routes between participating jurisdictions to decarbonize their operations either using sustainable and lower carbon fuels, or through the use of carbon credits to offset emissions.

CORSIA set forth a phased implementation that began with a pilot phase from 2021 through the end of 2023, followed by the first full implementation phase from 2024 through 2026, and concluding with a second phase from 2027 through 2035. In each phase, ICAO has adjusted its definitions of acceptable credits, including reducing the number of credit-issuing standards accepted during the first phase from the pilot phase. Therefore, it is not possible to directly compare supply and demand for CORSIA-approved credits between 2023 and 2024, as a different set of rules was in place before 2024.

CORSIA remains an important source of demand for some classes of credits, but it is no longer the only compliance carbon market accepting credits that originate from the VCM (see Box 2). Several emissions trading and carbon tax systems now accept credits generated domestically or internationally, and each of these carbon pricing mechanisms has its own set of rules governing the use of voluntarily developed carbon credits. The de facto role of quality arbiter that CORSIA once played is now being taken over by initiatives like ICVCM and by independent carbon project ratings agencies. This shift was reflected in Respondents' qualitative reflections captured in our sentiment survey (see EM Respondent Sentiments on the VCM in 2024 , p 29); only seven percent of Respondents mentioned CORSIA in their responses to the open-ended questions on our survey, compared to 36 percent who mentioned ICVCM and/or CCPs, 19 percent who mentioned ratings agencies, and 13 percent who mentioned compliance carbon markets.

ICVCM Core Carbon Principles

Section Insights

- ICVCM approved five project types for CCP eligibility in 2024, but only three types of credits (Landfill Gas, Fugitive Emissions, and ODS) were widely available to buyers.
- The average price of Landfill Gas credits increased by 35 percent from the first half of the year to the second half of the year with 3.1M credits traded, which is a 149 percent increase in volume from 2023.
- While approval of REDD+ and ARR methodologies is a promising sign for demand in the Forestry and Land Use category, the main methodologies for these project types did not register any projects as of 2024.

One of the most impactful developments in the VCM in 2024 was the continued roll-out of ICVCM's Core Carbon Principles (CCPs), a framework for voluntary carbon credit integrity that focuses on program governance, verified emissions impact, and contributions to sustainable development. Over the course of the year, ICVCM approved six standards as CCP-eligible, meaning any credits issued by these standards that meet CCP requirements for the relevant carbon credit category will automatically be CCP-approved. ICVCM also made progress in assessing the eligibility of methodologies for some carbon credit categories, which allowed the

first CCP-approved credits to begin trading on the market in August 2024.

Category assessments for CCP approval take place either through an internal assessment process or a multistakeholder working group process, which includes experts from within and outside ICVCM. At the end of July 2024, ICVCM released the first category approvals for Landfill Gas, ODS, and Leak Detection/ Repair in Gas Systems[2] project methodologies, which were assessed by an internal working group. Simultaneously, the determinations from the multistakeholder group reviewing renewable energy were released, rejecting most methodologies that used CDM tools to calculate additionality of new renewable energy projects.

In November 2024, the multistakeholder group focusing on REDD+ approved three REDD+ methodologies: two jurisdictional REDD+ methodologies from ART and VCS, and the project-based VM0048 methodology. The last category approvals in 2024 were for ARR projects using the VM0047 methodology, in December. While these approvals were seen as a sign of support for Forestry and Land Use credits in the VCM, very few CCP-approved REDD+ credits and no approved ARR credits are available yet for trading as of the publication of this report. Only two jurisdictional REDD+ programs from ART have issued credits: the Guyana and Costa Rica programs. VM0047 and VM0048, both developed by Verra, the developer of the VCS standard, are new methodologies. Credits will be issued in both of these methodologies from both new projects, as well as projects transitioning from other methodologies. The first VM0047 ARR project was registered in April 2025, and Verra is still collecting and publishing baseline data that will be required for REDD+ projects to transition.

Of the three project categories with an existing supply of CCP-approved credits on the market, the most liquidity in 2024 was from Landfill Gas, with 3.1 million tons traded over the year, a 149 percent increase in volume from the year before. There were 927,000 tons of Fugitive Emissions credits traded, and 135,000 tons of ODS credits traded, an increase in volume for both of these project types as well. Although the record of CCP-approved credit transactions is brief, approval seems to be clearly affecting the price of Landfill Gas credits, with the average price of CCP-approved credits in this project type increasing by 35 percent from the first half of the year to the second (Figure 8).

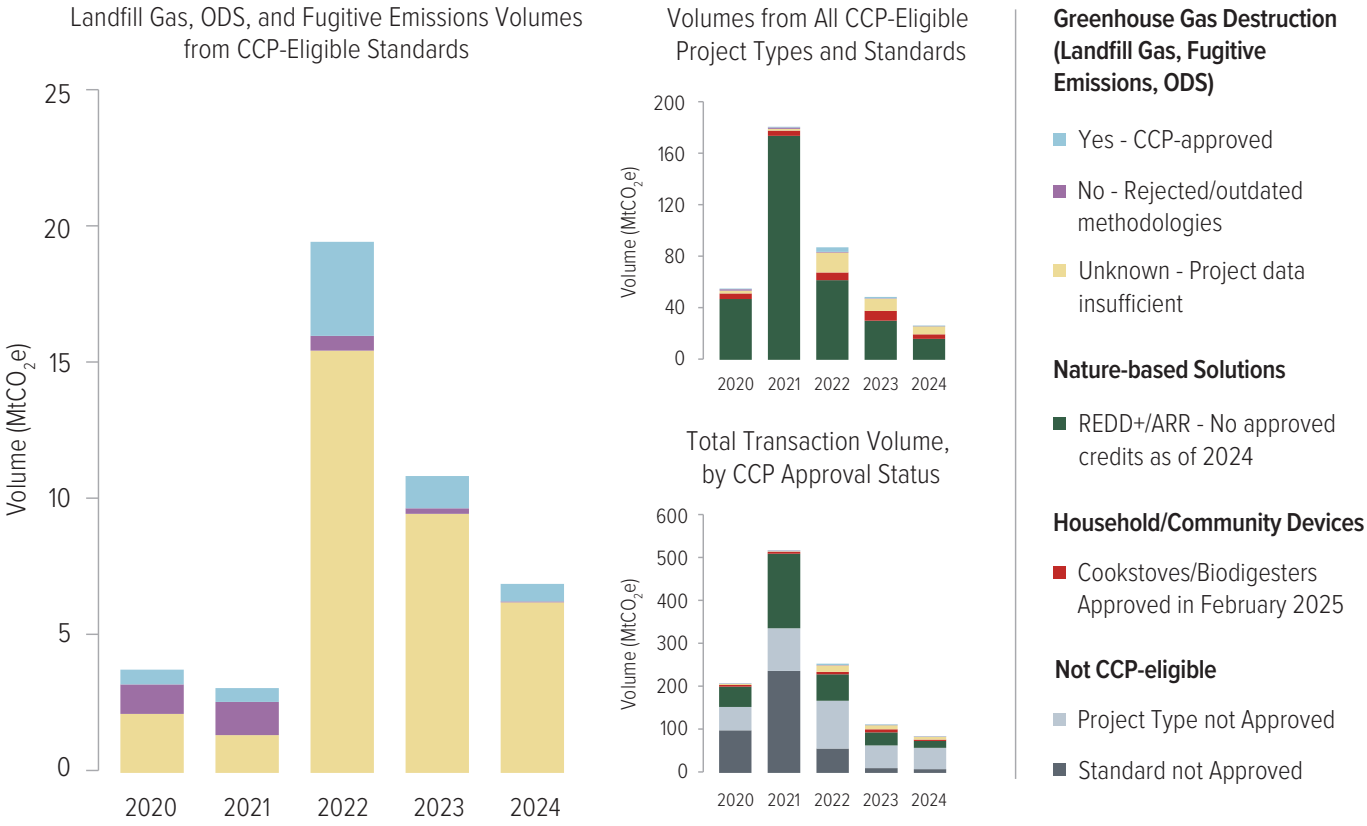
Looking forward to 2025 and beyond, the impact of continued project category approvals or rejections, including the approval of Household Biodigester and Efficient Cookstoves methodologies in February 2025, is sure to significantly reshape the VCM. However, as the lack of available approved ARR and REDD+ credits demonstrates, simply approving a project type is only the first step in delivering supply of CCP-approved credits to the market. As credit-issuing standards update their methodologies to bring them into compliance with the CCPs, there is a lag in validation for projects that wish to switch to these updated methodologies, and that can delay CCP-approved credits from reaching buyers and end users.

EM Respondents shared that ICVCM approval was one of the issues that was front of mind for them in 2024, with 22 percent of Respondents to our qualitative survey mentioning the CCPs specifically in their unstructured responses, and 36 percent mentioning ICVCM more generally. The majority of Respondents had a positive view of the CCPs, with 33 percent saying they would have a strong positive impact and 30 percent saying they would have a weak positive impact (see EM Respondent Sentiments on the VCM in 2024, p 29). Respondents noted that the availability of CCP-approved credits on the VCM had an immediate impact, with some Respondents able to sell credit types that were previously less attractive to buyers. However, other Respondents, while cautiously optimistic toward the CCPs, noted that they also introduced additional complexity and, thus, increased projects costs and credit prices. This could ultimately deter risk-averse buyers, especially from project types like IFM that have not yet undergone category assessments.

At the moment, it appears that the immediate outcome of ICVCM's CCPs has been to create a subset of highly assured credits, which are viewed with the greatest confidence in emissions mitigation impact and responsible development. However, ICVCM's internal and multistakeholder working groups cannot publish category assessment decisions fast enough to satisfy all

[2] Included in the Fugitive Emissions cluster in EM's project type taxonomy.

Figure 8. Transaction Volume for CCP-Eligible Carbon Credits Compared to Total VCM, 2020-2024



Note: The left chart includes transaction volumes for credits from Landfill Gas, ODS, and Fugitive Emissions project types issued by ACR, CAR, Gold Standard, and VCS, the only standards which had issued CCP-eligible credits for these types as of 2024. The top right chart includes the volumes at left and adds reported transactions from Cookstove Distribution, ARR, and REDD+ credits from these standards, as well as the ART Jurisdictional REDD standard. The bottom right chart includes annual transaction volume from all standards and project types, including those which have been rejected or which have not been assessed by ICVCM to date.

market actors while also maintaining integrity and consistency in applying the CCPs across diverse project types.

There will always be some carbon projects which lie outside of the CCPs, either because they are developed using a standard that is not included or because the market share of the project type is too small for ICVCM to prepare a category assessment. This includes novel project types, which inherently have small market share because they have not yet scaled up. For the VCM to continue to progress as a mechanism that allows for experimentation in establishing new project types for emissions reductions or removals financed by carbon credits, the assurance and deliberation of ICVCM's CCPs need to be paired with an equal spirit of impact-driven innovation and risk-taking outside of the bounds of existing approved project types.

Independent Credit Ratings Agencies

Section Insights

- Independent rating agencies that score the quality of carbon credits have emerged as a service helping inform buyers' evaluations of carbon project quality. However, inconsistency between different agencies' methodologies for evaluating projects can cause confusion for buyers and frustration for suppliers.

Another type of initiative that continues to gain traction for denoting project quality in the VCM is independent, privately-owned carbon credit ratings agencies, including BeZero, Sylvera, MSCI, and Calyx Global. These companies intend to

become the equivalent of credit ratings agencies in bond markets, providing neutral analysis of carbon projects to determine their quality and integrity. The ratings analysis and methodologies are variously defined as including adherence to the principle of additionality, proper use of methodological tools for carbon accounting, the permanence of emissions reductions or removals, the degree of operational risk associated, and the presence or absence of social and/or environmental co-benefits.

Because credit ratings agencies use opaque methodologies, which they have designed independently from their competitors, they do not produce the same results in all cases. Nineteen percent of Respondents answering our sentiment survey mentioned credit ratings, with many noting the uncertain impact and potential to confuse buyers, while others suggested the growth of ratings indicates a maturing market. It's important to note that EM's Respondents represent the supply side of the market, who see ratings as another layer of due diligence for buyers. Meanwhile many buyers view ratings as a useful tool for purchasing decisions, despite some confusion from the inconsistencies of ratings across the different agencies.

Box 3. Current and Future Implementation of Article 6 Mechanisms

Key Terms

Article 6 of the Paris Climate Agreement: A framework for international cooperation in achieving set ambitions around climate action, known as **Nationally Determined Contributions (NDCs)**, through market and non-market mechanisms.

Article 6.2: Permits two or more countries to cooperate bilaterally to trade Article 6.2 units directly.

Article 6.4: Permits countries to trade credits through a central carbon crediting mechanism, the Paris Agreement Crediting Mechanism (PACM), which is a registry of projects approved for international credit trading and is overseen by the UN's 6.4 Supervisory Body, which will approve methodologies, register projects and maintain the registry. Host countries are permitted to trade credits with not only buyer countries, but other entities as well through PACM.

2024 was a historic year for implementation of Article 6 of the Paris Climate Agreement. At COP29 in November, nine years after the Paris Agreement entered into force, countries finally agreed on core elements of Article 6.4 and approved the rules governing the PACM, which is required for implementation of Article 6.4. In January 2024, Switzerland and Thailand completed the first ever transfer of Article 6.2 carbon credits. Consequently, market participants have high expectations of the impact that Article 6 mechanisms, particularly 6.2 and 6.4, will have on demand and supply in the VCM as they anticipate the operationalization of Article 6 going into 2025.

In 2024, countries continued to engage bilaterally through agreements or other official statements that demonstrate their intention to trade mitigation outcomes under Article 6.2. Over the past year, there were eight Bilateral Agreements (BAs), nine Memorandums of Understanding (MoUs) and two other types of agreements signed. As of April 2025, there were a total of 96 cooperative agreements (BAs, MoUs, and other types) in place between 59 different countries. The ways in which countries can trade 6.2 credits bilaterally to address their NDCs will vary according to each agreement. Countries must consider not only their own, but the other country's NDC needs and national carbon strategy, such as carbon taxes, implementation of national carbon registries, etc., when negotiating the terms of the bilateral trade.

As of March 2025, PACM, the 6.4 mechanism, approved its first credits, from a cookstove project transitioning from the CDM. These credits were from a renewable energy methodology that was rejected by ICVCM during assessment for CCP eligibility. It is estimated that over one thousand CDM projects have applied for PACM approval. *(continued)*

Box 3. Current and Future Implementation of Article 6 Mechanisms *(Continued)*

While the UNFCCC has positioned the PACM as the UN's high-integrity carbon crediting mechanism, many are concerned about the potential approval of low-quality CDM projects to transition to the new standard. The approval of these outdated credits from older methodologies would flood the market with a supply of low-quality credits and also call into question whether Article 6.4 can be considered an indicator of high-integrity credits.

While market participants eagerly await the effects of Article 6.2 and 6.4 mechanisms on supply and demand in the VCM, it is not yet clear what effect the operationalization of Article 6 will have on the market. The impact of Article 6.2 on the VCM will be dependent on country strategies for addressing their NDCs and how their 6.2 transactions fit into those strategies for both the host and buyer countries. The impact of Article 6.4 on the VCM will also take time to understand, as PACM is developing slowly as all parties advocate for their own interests in the multilateral process. In 6.4 negotiations where the buyer is a company hoping to meet its emissions offsetting needs, only the host country must consider how the trade will impact their NDCs.

Market participants reflected on the impact of Article 6 policy developments on the VCM in EM's qualitative sentiment, with 58 percent of Respondents saying Article 6 would have a positive impact on the VCM. Despite this optimism, the survey also reflected uncertainty about how quickly Article 6 mechanisms can be operationalized, with 61 percent of Respondents saying that the jurisdictions where they transact credits were not ready to participate in Article 6 carbon markets. These sentiments further reflect the combination of high expectations paired with the reality of the pace of Article 6 implementation.

EM Respondent Sentiments on the VCM in 2024

Section Insights

- Respondents' perception of their relative volume and value of carbon credit sales in 2024 was diverse, reflecting divergent trajectories for project types within the VCM.
- In 2024, government policies were perceived as an increasingly important factor in supporting or limiting the VCM. Forty one percent of Respondents identified government policies as important, more than double the proportion from 2023, highlighting their anticipation of the expected impact of the Article 6 implementation on the VCM.
- Respondents anticipate beneficial impacts from ICVCM's CCPs on the VCM, with 64 percent viewing it positively.
- Respondents view companies' climate targets as less important in 2024 than in 2023, with some sophisticated credit buyers pursuing offsetting strategies outside of frameworks like SBTi.

In addition to collecting quantitative data on VCM transaction volume and value in 2024, EM also surveyed EM Respondents to capture qualitative feedback and market sentiments on the VCM in 2024. EM received survey responses from 66 Respondents. These nuanced views and individual narratives illustrate how complex even a single year of market activity can be.

Respondents' individual reports on volume and price movements in 2024 confirm the diverse trajectories for different market segments around the world. For example, while overall market volume reported to EM by Respondents fell from 2023 to 2024, more Respondents answering our survey said that their transaction volume had increased (27) than those who said volume decreased (20). In terms of price, the plurality of Respondents (21) said that their average credit sale price in 2024 was about the same as the year before. While reported average prices from transactions declined six percent from 2024, this transaction price decline does not appear to be evenly distributed across all respondents. This demonstrates the wide variety of outcomes across the market, which continues to motivate new entrants that have novel approaches to project development and credit marketing.

For the second year, we asked Respondents about their perception of the most important external factors affecting their sales of carbon

Figure 9. Respondent Perception of Sales Volume and Credit Price Trajectory, 2023 to 2024

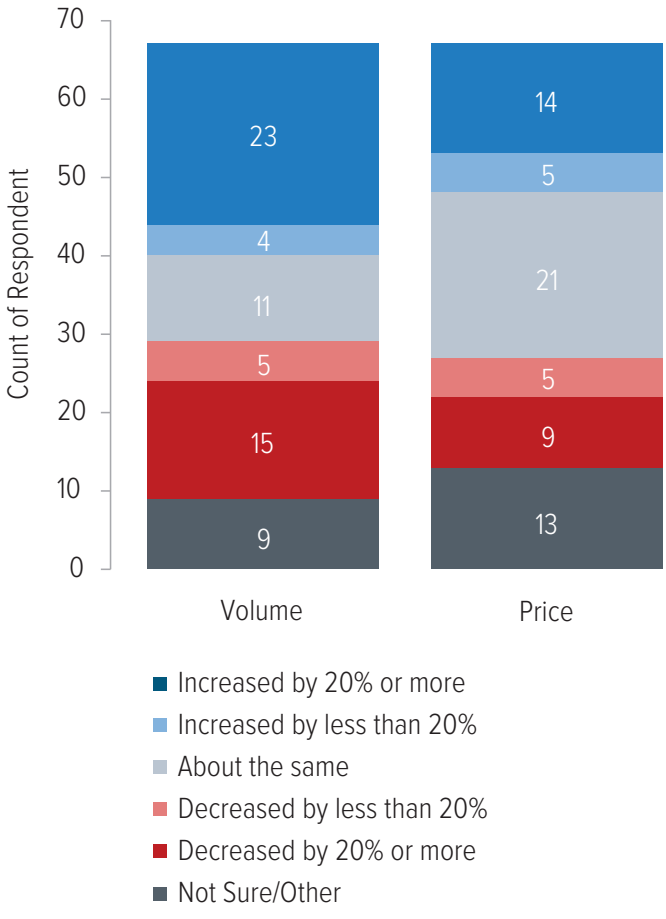
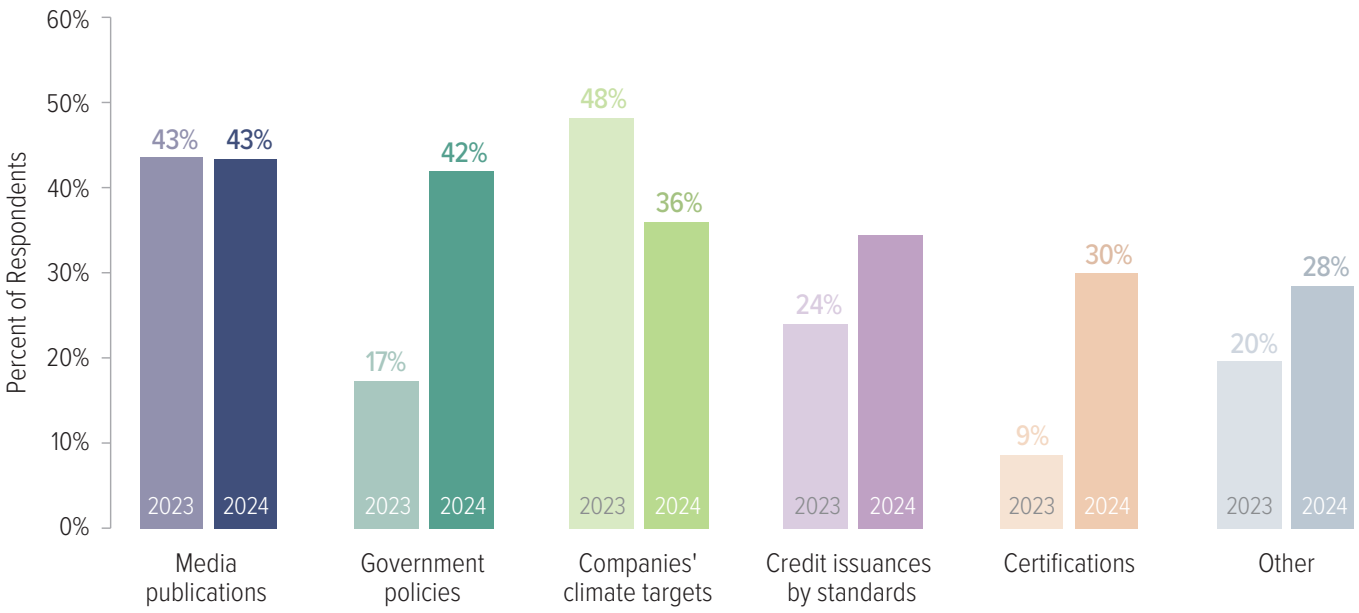


Figure 10. Respondent Perception of the Most Important External Factors Influencing Credit Sales, 2023 vs. 2024



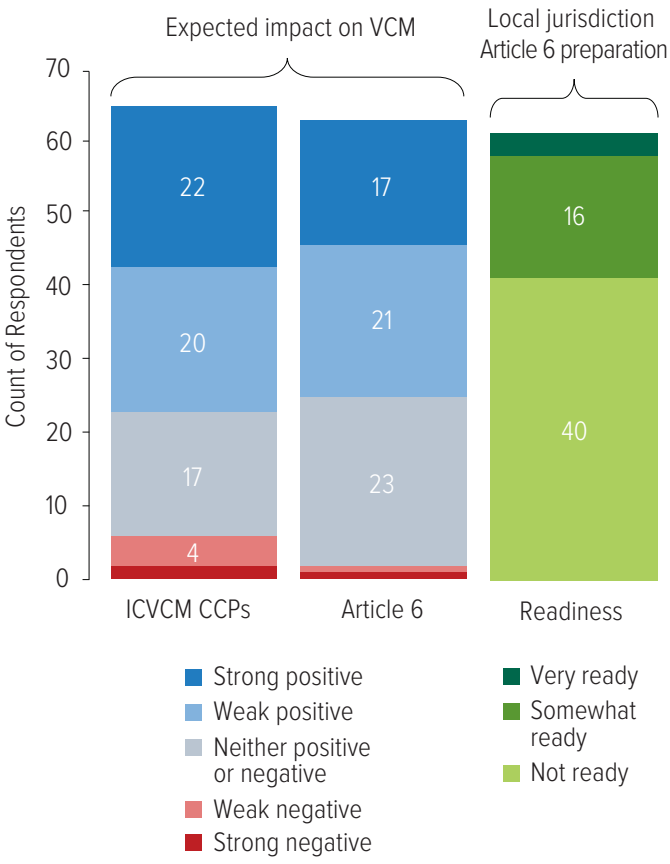
credits. The most frequently identified factor was coverage by media publications, with 43 percent of Respondents including this in their response, the same share as in 2023. The second most important external factor affecting the VCM was government policy, which 42 percent of Respondents selected, a major increase from the 17 percent identifying government policy as a key factor last year. Companies' climate targets receded slightly as a key factor driving VCM developments, with only 36 percent of Respondents selecting this, compared to 48 percent of Respondents in 2023. Another emerging factor in 2024 was credit certifications, with 30 percent of Respondents indicating certifications' importance in their response, compared to just nine percent of those completing the survey last year.

The growing emphasis on government policy and credit certification and declining importance of voluntary climate targets was reflected across responses to our survey. We asked Respondents about their perception of the impact of two key market developments in 2024: the operationalization of ICVCM's CCPs and Article 6 of the Paris Agreement (see ICVCM Core Carbon Principles section, p 24, and Box 3, Article 6 of the Paris Agreement, p 27). On the whole, Respondents view both as beneficial to the VCM, with 64 percent saying the CCPs would have a positive impact and 58 percent saying Article 6 would have a positive impact. More Respondents thought Article 6 would have a neutral impact, with 35 percent saying the impact would be neither positive nor negative, compared to 26 percent who indicated the same about the CCPs.

Despite the anticipated positive impact of Article 6 operationalization, 61 percent of respondents said that the jurisdictions where they transact credits were not ready to participate in Article 6 carbon markets. Thus, while anticipation of and support for Article 6 developments is high, market participants question how quickly Article 6 mechanisms will be implemented globally and directly impact VCM supply, demand, and growth.

Respondents also had the opportunity to provide unstructured responses on several questions, including on the subjects of positive and negative factors in the VCM and the impact of ICVCM. These responses provide more context to Respondents' answers to the other multiple-choice questions in the survey.

Figure 11. Respondent Perception of ICVCM's Core Carbon Principles and Article 6 on VCM, and Article 6 Readiness



Respondents provided nuanced perspectives on how some of the same initiatives driving optimism in the VCM also create confusion and concern when market actors lack clarity on how to operationalize potentially contradictory recommendations. In particular, Respondents brought up ICVCM and ratings agencies repeatedly (36 percent and 19 percent of responses, respectively), both as potential drivers of demand towards high-quality projects, and as opaque gatekeepers whose findings are difficult to communicate to credit buyers and other VCM stakeholders.

Consistent with Respondents' perception of the most important external factors affecting their credit sales, only 10 percent of Respondents mentioned the Science Based Targets Initiative (SBTi) in the unstructured section of their survey. This appears to be indicative of the growing importance of regulated credit markets flowing into demand from domestic compliance markets and international commitments negotiated through Article 6, over the declining influence of voluntary decarbonization frameworks like SBTi.

Conclusion

The past year of market activity and policy development in the VCM has felt challenging at times for its participants, much like 2022 and 2023, which were similar years of market contraction. However, EM's carbon market research, anchored by actual realized transaction data sourced from project developers, credit aggregators, and intermediaries, reveals more nuanced trends in credit supply and demand. With the decline in transaction volume slowing to a 25 percent annual decrease, compared with the 50 percent of transaction volume lost annually over the course of 2022 and 2023, and with average credit prices sticking above $\$6/tCO_2e$ during the same period, the VCM of 2024 is structurally different from what came before. With multiple interrelated approaches to quality and integrity, VCM actors can make more informed choices around credit supply and demand that reflect their intended values.

As in the past two years, EM has observed distinct trajectories for credits from different project types and with different attributes. The Forestry and Land Use category has been the largest category by transaction volume since 2021, and in 2024 it became the category with the most credits retired annually. The category continues to evolve and place more emphasis on IFM projects and nature-based removals, such as ARR, as a driver of value. As 99 percent of removal credits sold on the market are from nature-based projects, increased buyer demand for removals has supported the market value of Forestry and Land Use credits.

The much-anticipated operationalization of ICVCM's Core Carbon Principles in 2024 was limited in practice to three project types, but CCP approval has already led to a 35 percent increase in price for credits from eligible Landfill Gas projects, which drove a 3X increase in transaction volume for the Waste Disposal category compared to 2023. As ICVCM continues to approve project types for eligibility and standards continue to make credits from newer methodologies available on the market, this mark of integrity will drive buyer demand to diverse project types. Registry data shows that retirements are holding a steady pace, and frameworks like the CCPs provide buyers with confidence to continue to invest in carbon credits that meet relatively high levels of integrity.

Many other important developments in the market during 2024 indicated sustained ambition towards fulfilling the positive potential of the VCM, including the full approval of Article 6 of the Paris Agreement, the beginning of the first compliance phase of the CORSIA international aviation decarbonization scheme, and the continued growth of independent credit ratings agencies. It is clear that the market has been compelled to introduce multiple frameworks for quality and integrity. This is to the benefit of credit buyers, who now have an increased number of options for how to communicate their choices around credit purchases and offsetting strategy.

In 2024, the VCM functioned effectively in advancing climate mitigation by continuing to drive innovation towards new types of credit-generating projects. While 50 percent of the market trades below average price, 25 percent of transactions come from project types that trade above average price, including improved cookstoves projects, IFM, and carbon removal methodologies, such as ARR and engineered removals. The future evolution of the VCM will come from these project types, as well as project types that have yet to gain prominence. As a driver of innovation towards climate action and a key conduit for private finance for a green transition, the VCM continues to advance, and results across different segments of the market in 2024 are beginning to bear fruit.

Appendices

Data and Methodology

Most of the data in this report comes from self-reported transaction data from EM Respondents, typically project developers, investors, and intermediaries (i.e., sell-side market participants). Data on project registrations, credit issuances, and credit retirements are sourced from carbon standard registries. In the 2025 State of the VCM Report, EM included data from the American Carbon Registry (ACR), Architecture for REDD+ Transactions (ART), BioCarbon, Climate Action Reserve (CAR), Clean Development Mechanism (CDM), Cercarbono, Global Carbon Council (GCC), Gold Standard, Plan Vivo, and Verified Carbon Standard (VCS) registries.

Average carbon credit prices are volume-weighted, calculated from transactions with reported price and volume (the majority of transactions reported to EM). To calculate the total transaction value, this average price is multiplied by the total volume of transactions (including transactions without an associated price). In other words, the volume-weighted average price for transactions with price is assumed to extend to transactions reported without price.

For project registrations, only projects that had been approved by the relevant registry were included, whether or not credits were issued for projects. EM used the provided project registration date where available; for Gold Standard projects, the date of the first credit issuance for a project was used for the date of project registration. Any reserve or buffer volume from registry data on issued credits was removed, where provided data made that possible.

EM is the world's largest repository of VCM transaction data, however, the volumes presented throughout this report should not be considered to be a complete representation of market trading activity. EM works actively to engage with all market participants. As reporting to EM is voluntary, and many market actors are not yet reporting to EM, the actual volume of credits transacted in the voluntary market is likely higher than the amounts published here. See a list of EM Respondents from the past two years whose data is represented in this report below.

EM Respondents, 2023-2024

- 3Degrees
- ACCIONA
- Across Forest AS/Across Nature AS
- AGL
- Agrocortex
- Agroempresa Forestal
- Agroinsider
- Akre
- ALLCOT
- Anew Climate
- Appalachian Mountain Club
- Arbor Day
- Beijing Qianyuhui International Environmental Investment Co., Ltd. (QYH)
- BioCarbon Partners
- Biofílica Ambipar Environment
- BIOFIX
- BOCS Foundation
- Bonneville Environmental Foundation
- Bosques Amazonicos
- BRCarbon
- Canopée
- Carbonapp
- Carbone boréal (Université du Québec à Chicoutimi)
- Carbon Expert
- Carbonext
- Carbon Offsets To Alleviate Poverty (COTAP)
- CarbonReset
- CarbonStore - Tillhill
- Carbon Tanzania

- Cawa Tech
- CBL Markets (Xpansiv)
- CIMA
- Clean Air Action Corporation (TIST Program)
- Climate Bridge Ltd.
- ClimeCo
- C-Neutral
- CO2CERO
- CO2Logic
- Conservation International
- Cool Effect
- Cooperativa AMBIO Programa Scolel'te
- C-Quest Capital
- Credible Carbon
- Eco2librium
- ECOEYE
- Econegocios
- Ecopart Assessoria em Negocios Empresariais Ltda. (EQAO)
- Ecosecurities
- Ecosphere+
- EKI-EnergyServices
- El Guásimo
- Emergent Ventures
- ENGIE
- Enviro-Mark Solutions Ltd (trading as Toitū Envirocare)
- Everland
- FairClimateFund (formerly, Hivos Carbon Credits)
- Fondo Accion
- Forest Carbon Ltd (UK)
- FORLIANCE GmbH
- Fundação Carbon Offset Timor (FCOTI)
- Fundación para el Ecodesarrollo y la Conservación (FUNDAECO)
- Future Climate
- Futuro Forestal
- Global Forest Partners
- global-woods international AG
- GoodPlanet
- Gould International
- Greenoxx
- Grupo Ecologico Sierra Gorda
- Highland Carbon
- ID Water
- Infinite Solutions
- Inlandsis Fund
- Integrador de Comunidades Indígenas y Campesinas de Oaxaca AC (ICICO)
- King County, Washington
- Land Carbon Ltd
- Livelihoods Venture
- Louis Dreyfus Company
- MEXICO2
- Microsol
- Mongolian Society for Rangeland Management
- Nature Conservancy Canada
- Nedbank
- Nideport
- Nordic Offset
- OurOffset
- Pachama
- Point Zero International
- PRIMAKLIMA
- Pronatura
- Prosustentia
- Proyecto Mirador
- Quadriz
- Rabobank
- Relief International
- Rubicon Carbon
- Sanko Enerji
- Soluciones Proambientales
- South Pole
- Swiss Climate
- Sylvestris
- Taking Root
- Terra Global Capital
- The Association for Coastal Ecosystem Services (ACES)
- The Climate Trust
- The Future Forest Company
- The Nakau Program
- The Nature Conservancy
- The Voluntary Climate Marketplace
- The Woodland Trust
- Timing Carbon Asset Management Co., Ltd.
- Trees for Life
- TreeStory
- UPM
- VNV
- We Are Neutral
- WeForest
- ZeroMission

Glossary of Terms

Additionality: Additionality describes the basis for issuing carbon credits for project activities that would not occur without finance from the sale of credits. Carbon credits can only be issued if the reduction or removal of carbon emissions would not otherwise have taken place. For example, a solar energy installation that would be profitable to build without the sale of carbon credits is not considered additional, but a cookstove distribution project that reduces the burden of deforestation is additional, because deforestation would continue at a high rate if the cookstoves were not supplied to local communities. Different project methodologies have specific modules for calculating project additionality.

Afforestation-Reforestation/Revegetation (ARR): A group of Forestry and Land Use project types that establish new forests or restore deforested/degraded forests through tree planting and revegetation. ARR projects generate nature-based removal credits.

Article 6 of the Paris Climate Agreement: A framework for international cooperation in achieving set ambitions around climate action, known as Nationally Determined Contributions (NDCs), through market and non-market mechanisms. See Box 3, page xx for details.

Article 6.2: Permits two or more countries to cooperate bilaterally to trade Article 6.2 units directly.

Article 6.4: Permits countries to trade credits through a central carbon crediting mechanism, the Paris Agreement Crediting Mechanism (PACM). Host countries are permitted to trade credits with not only buyer countries, but other entities as well through PACM.

Blue Carbon: A group of Forestry and Land Use project types that reduce/remove carbon dioxide from marine and coastal environments by restoring, conserving, or managing ecosystems, including wetland, mangrove, and seagrass habitats.

Co-benefits: Social or environmental benefits provided by a project in addition to the greenhouse gas emission reductions/removals that generate carbon credits. For example, a project that restores natural ecosystems and has benefits for carbon storage, biodiversity, and local communities. Credit standards can indicate if a project provides certain co-benefits through independent certifications (e.g., Verra's Climate, Community, and Biodiversity certification for projects that contribute to biodiversity) or by indicating which UN Sustainable Development Goals (SDGs) that the projects contribute towards.

Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA): A compliance program for offsetting emissions from international aviation, operated by the International Civil Aviation Organization (ICAO). Only certain credits that meet ICAO's eligibility criteria—specific standards, methodologies, co-benefits, project locations, and vintages—can be used as offsets for CORSIA. CORSIA's pilot phase ran from 2021 to 2023, and its first implementation phase began in 2024.

Carbon Tax: A carbon tax sets a price on carbon by defining a tax rate on greenhouse gas emissions. It is different from an Emissions Trading Schemes (ETS) in that the emission reduction outcome of a carbon tax is not pre-defined but the carbon price is.

Credits: The individual units of greenhouse gas emissions reducing/removing activities that are issued by carbon market standards, and then bought, sold, and retired by the various carbon market actors (project developers, intermediaries, end users, etc.). Each credit is denominated as one metric ton of CO_2 equivalent (tCO_2e) and corresponds to the estimated amount of greenhouse gas emissions that a project removes or reduces from the atmosphere.

Emissions Trading Schemes (ETS): Often referred to as a cap-and-trade system, ETS cap the total level of greenhouse gas emissions and allow those industries with low emissions to sell their extra allowances to larger emitters. By creating supply and demand for emissions allowances, an ETS

establishes a market price for greenhouse gas emissions. The cap helps ensure that the required emission reductions will take place to keep the emitters within their pre-allocated carbon budget.

End User/End Buyer: An entity (individual, company, organization, etc.) that purchases carbon credits, either directly from the project developer or from an intermediary, with the intention of retiring the credits to claim as offsets against emissions (see Retirements).

Engineered Credits: Credits generated by projects that use technological solutions to reduce or remove greenhouse gas emissions. This includes projects in the following categories: Chemical Processes/Industrial Manufacturing, Energy Efficiency/Fuel Switching, Household/Community Devices, Renewable Energy, Transportation, and Waste Disposal.

Greenhouse Gases (GHGs): Gases that trap heat in the atmosphere and lead to global warming. Carbon dioxide (CO_2), methane, and nitrous oxide are the primary greenhouse gases emitted into the atmosphere by human activities contributing to climate change.

Greenwashing: Misleading characterizations of corporate actions to address environmental issues that make company efforts seem more impactful than they are. Companies claiming emissions offsets using low-quality carbon credits face the risk of being accused of greenwashing.

Improved Forest Management (IFM): A group of Forestry and Land Use project types that implement forest management activities to increase carbon storage in forests, and/or reduce greenhouse gas emissions from forestry activities. This cluster does not include projects that fall under the REDD+ framework (see REDD+).

Issuance: Following a project's registration, once it begins to generate emissions reductions or removals, a third-party auditor will verify that the methodology applied in the project design is being followed and confirm that the climate impact of the project is in line with expectations, allowing the standard to issue credits to the project developer.

Methodology: The technical documentation that describes the procedures and requirements for specific types of project activities, including procedures for quantifying the volume of greenhouse gas emissions reduced and/or removed by the project. Some projects will use multiple methodologies to cover different elements within a single project. Standards may develop their own methodology documentation and/or provide a list of methodologies from other standards that they will accept.

Nationally Determined Contribution (NDC): NDCs represent efforts by each country to reduce national emissions and achieve set goals around climate ambition. The Paris Agreement requires each Party to prepare, communicate, and maintain NDCs that it intends to achieve.

Nature-based Credits: Credits generated by projects that achieve greenhouse gas emissions reductions or removals by conserving, restoring, and/or managing natural and agricultural ecosystems. All projects within EM's Agriculture and Forestry and Land Use categories are considered nature-based credits.

Net-zero: An organization is considered to have achieved net-zero emissions when it reduces at least 90 percent of initial emissions and compensates for the residual emissions through offsetting with carbon credits. Net-zero is a more stringent standard than the related term "carbon neutral," which does not require emissions abatement and can be accomplished through emissions offsets alone.

Paris Agreement Crediting Mechanism (PACM): A registry of projects approved for international credit trading and is overseen by the UN's 6.4 Supervisory Body, which will approve methodologies, register projects, and maintain the registry.

Project Category: Category is the broadest classification level that EM uses to group projects by the type of activities involved. EM has eight Project Categories: Agriculture, Chemical Processing/

Industrial Manufacturing, Energy Efficiency and Fuel Switching, Forestry and Land Use, Household/Community Devices, Renewable Energy, Transportation, and Waste Disposal. Within each category, EM groups projects into more specific Project Clusters and the most specific Project Types.

Project Registration: When a credit issuing standard determines that a prospective project meets the necessary criteria established in a published methodology, including third-party validation and assurance, and gives official approval to list the project in that standard's registry. Once registered, a project can submit requests for credit issuances (see Issuances).

REDD+: Reduced Emissions from Deforestation and Degradation in Developing Countries. These Forestry and Land Use projects are developed based on the voluntary REDD+ framework, developed by the UNFCCC to encourage financing of forest conservation and management in lower income countries where forests are at risk of land-use change or reduced carbon storage.

Reduction Credits: Credits generated by projects from the volume of greenhouse gas emissions that were reduced or avoided through project activities. For example, a project that improves building weatherization and thereby reduces the burden of emissions from heating or air conditioning. Some nature-based carbon projects both reduce and remove (see Removal credits) greenhouse gas emissions, and credits from these projects are considered to include both reduction and removal credits.

Removal Credits: Credits generated from the volume of greenhouse gas emissions that a project removed from the atmosphere or ocean through the creation of a carbon sink/pool. For example, an afforestation/reforestation project that increases vegetation to sequester carbon.

Registration: Carbon projects must pass through a series of design validation and auditing steps, including potential public comment periods, before they are approved by standards and given registered status.

Registry: Can refer either to databases of registered projects and issued and retired credits maintained by standards, or to aggregations of credits meeting certain criteria, such as eligibility for use in a compliance carbon market.

Retirement: A credit may pass through many hands from the project's developer, or it may be sold directly to its end user, who will "retire" the credit by requesting the standard to add the specific credit to its registry of retired credits.

Scope 3 Emissions: Greenhouse gas emissions that are indirectly caused by a company through any activities other than the generation of purchased energy. A major source of Scope 3 emissions is a company's value chain, which includes emissions from both upstream (e.g., agricultural production) and downstream (e.g., use and disposal of products by consumers) supply chains. For some companies, such as those in consumer goods sectors that rely heavily on agricultural and forestry commodities, the vast majority of their carbon emissions are embedded in their value chains.

Standards: The organizations that define the project activities that can produce carbon credits and publish methodologies outlining the calculation of credits generated by a project, as well as approving and tracking project registration and credit issuance and retirement.

Vintage: The year in which project emissions reductions or removals were determined to have occurred (or estimated to occur in the future). This does not have to match the year that the credits were issued; there can be lags between the actual reductions/removals and the issuance of credits, and some standards issue credits for future estimated reductions/removals.

Supplementary Tables

Table S1. Number of Project Registrations by Category, 2020-2024

Project Category	2020	2021	2022	2023	2024
Agriculture	23	6	22	27	26
Chemical Processes/ Industrial Manufacturing	23	20	86	56	69
Energy Efficiency/Fuel Switching	102	1	10	5	2
Forestry & Land Use	236	89	108	130	114
Household/Community Devices	127	118	194	329	222
Renewable Energy	988	111	151	129	158
Transportation	8	2	37	3	8
Waste Disposal	30	1	11	15	17
Total	1537	348	619	694	616

Note: This table includes data on project registrations from ACR, ART, BioCarbon, CAR, CDM, Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and VCS registries.

Table S2. Volume of Credit Issuances ($MtCO_2e$) by Category, 2020-2024

Project Category	2020	2021	2022	2023	2024
Agriculture	1.1	4.0	9.0	6.6	3.2
Chemical Processes/ Industrial Manufacturing	18.2	20.3	43.1	23.8	23.8
Energy Efficiency/Fuel Switching	9.5	14.5	25.1	11.8	7.9
Forestry & Land Use	75.9	140.0	146.5	124.0	86.7
Household/Community Devices	18.4	26.4	25.2	56.7	65.9
Renewable Energy	147.1	209.9	244.7	161.0	117.9
Transportation	0.2	0.1	0.03	0.4	0.2
Waste Disposal	8.5	7.9	7.8	5.8	6.0
Total	278.8	423.1	501.3	390.0	311.5

Note: This table includes data on credit issuances from ACR, ART, BioCarbon, CAR, CDM, Cercarbono, Global Carbon Council, Gold Standard, Plan Vivo, and VCS registries.

FOREST TRENDS

Pioneering Finance for Conservation

Biodiversity Initiative

Promoting development of sound, science-based, and economically sustainable mitigation and no net loss of biodiversity impacts

Coastal and Marine Initiative

Demonstrating the value of coastal and marine ecosystem services

Communities Initiative

Strengthening local communities' capacity to secure their rights, manage and conserve their forests, and improve their livelihoods

Ecosystem Marketplace

A global platform for transparent information on environmental finance and markets, and payments for ecosystem services

Forest Policy, Trade, and Finance Initiative

Supporting the transformation toward legal and sustainable markets for timber and agricultural commodities

Public-Private Finance Initiative

Creating mechanisms that increase the amount of public and private capital for practices that reduce emissions from forests, agriculture, and other land uses

Supply Change

Tracking corporate commitments, implementation policies, and progress on reducing deforestation in commodity supply chains

Water Initiative

Promoting the use of incentives and market-based instruments to protect and sustainably manage watershed services

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