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Carbon markets: Fluff or a concrete opportunity?

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Carbon markets will play a significant role in delivering global net zero. This was stressed by the UN Intergovernmental Panel on Climate Change (IPCC) in its April 2022 report on mitigating climate change, which noted that, "The deployment of carbon dioxide markets to counterbalance hard-to-abate residual emissions is unavoidable if net zero emissions are to be achieved."

Carbon markets reached their heights in terms of traded volumes and market value between 2021 and 2023, where both compliance and voluntary project-based carbon markets (formerly known as the voluntary carbon markets) experienced record transaction levels and market expansion. This was driven by ambitious climate targets and both governmental and corporate commitments.

While carbon markets have recently attracted curiosity from investors, they are not new. The idea of using economic mechanisms to control pollution was first articulated by Arthur Pigou in the 1920s who developed the idea of externalities – the costs or benefits of a transaction that are not accounted for in the price of goods manufactured and sold. In the case of carbon emission pollution, this would be a negative externality – the social and environmental cost of pollution is very rarely accounted for in the production and manufacturing of goods. Finland became the first country in the world to introduce a carbon tax in 1990, and in 2005, the EU established the world's first Emissions Trading Scheme. There are now over 70 carbon tax or emissions trading schemes implemented globally, and this number is only set to increase.

In this report, we provide an overview of carbon markets, revisit the factors driving growing investor interest and highlight key risks and considerations for investors. Furthermore, we discuss the various methods available for investing into carbon markets.

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What are carbon markets?

Carbon markets are mechanisms that put a price on carbon emissions and, thereby, incentivise a reduction in greenhouse gas (GHG) emissions.

There are two types of carbon markets:

Compliance carbon markets: These are regulated and enforced by governments and can consist of allowance-based mechanisms or a carbon tax.

- Under allowance-based mechanisms a central authority issues allowances, each of these allowances is equal to one tonne of CO2 equivalent (CO2e) and is effectively a permit to pollute. Allowance based markets are structured either as a cap-and-trade scheme, or as a baseline-and-credit scheme. The EU Emissions Trading Scheme (EU ETS) was the world's first cap-and-trade scheme established in 2005. Entities covered under the EU ETS must ensure that their annual emissions are covered by the equivalent number of allowances. The EU issues a predefined quantity 'cap' of allowances, which decline every year. Entities can then 'trade' these allowances based on their requirements to ensure they are compliant with the scheme on an annual basis; the EU enforces large penalties for non-compliance. However, under a baseline-and-credit scheme, such as in Australia, the central authority will issue allowances to entities that emit less than their defined baseline. These allowances can then be sold to other entities who may have exceeded their defined baseline.
- A carbon tax is a much simpler scheme and involves entities paying a central authority a predetermined fixed fee for each tonne of CO2e emitted on an annual basis, as is the case in Singapore, for example. The cost for emitting a tonne of CO2 is known, but the volume of emissions reductions that the tax will deliver is not. In some tax schemes, project-based carbon credits can be used for a certain volume of emissions in lieu of paying the tax, for example Singapore, Colombia and South Africa.

Project-based carbon markets (formerly known as voluntary carbon markets [VCM]): These markets are mechanisms whereby technology or nature-based projects avoid, reduce or remove carbon dioxide measured against a business-as-usual baseline and are issued with carbon credits depending on their performance against the baseline; one carbon credit is equal to one tonne of CO2e avoided, reduced or removed. Carbon Crediting Standards, such as Verra and Gold Standard, set out the methodologies and the criteria required for verifying and certifying carbon credits. These carbon credits have a multitude of demand use cases. They can be used in specific compliance markets. For example, in Singapore, 5% of an entity's exposure to carbon tax can be covered by purchasing specific high quality carbon credits determined by their government.

Carbon credits can also be used by private investors, governments, non-governmental organisations and businesses to meet their own climate action targets. Paying for carbon credits provides finance for carbon dioxide mitigation projects that would not be available otherwise.

Here, the concept of additionality is important, as a project's emissions reduction or removals need to be real and occurring only because of the project in place. For example, a tree-planting project is additional if the trees would not have been planted without the carbon credit revenue, while a large solar farm that is already financially viable without carbon credits is generally considered non-additional.

It is important to note that carbon credits can be traded multiple times between entities, but it is only once the credit is retired and effectively removed from circulation that the retiring entity can make any environmental claims against that credit.

Fig. 1

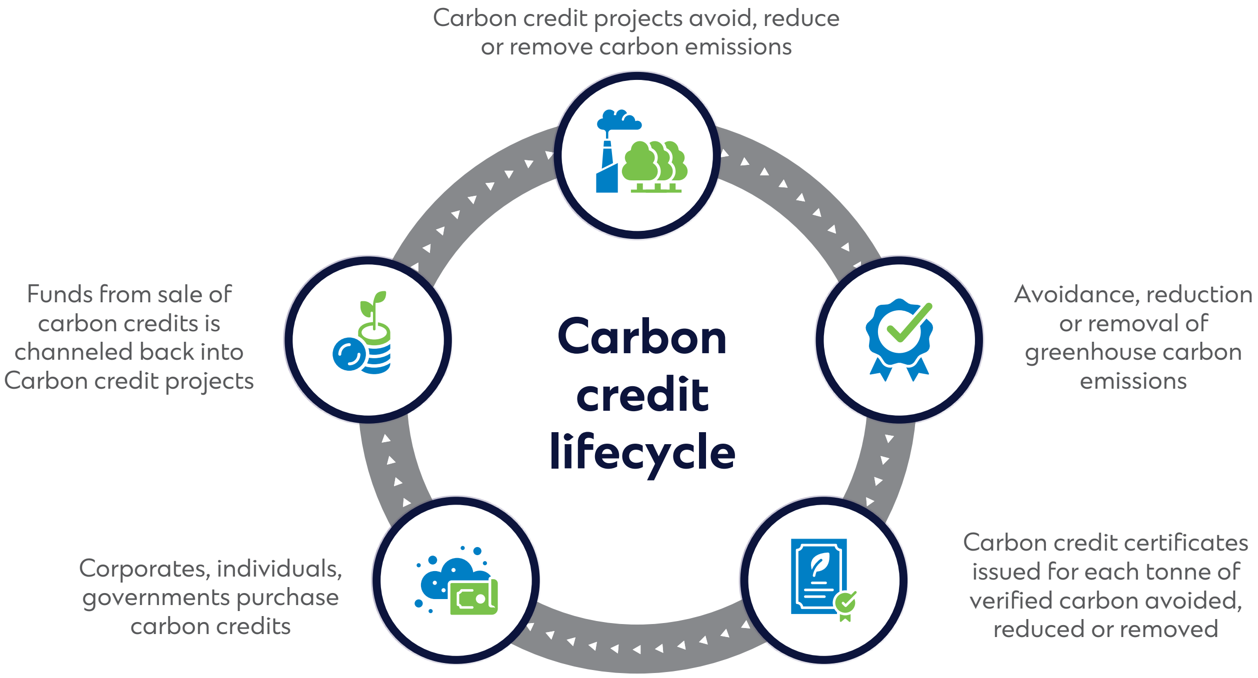
Differences between compliance and voluntary project-based carbon markets

Point of difference	Compliance carbon markets	Project-based carbon markets
Aim	Establish a carbon price by laws and/or control allowed pollution levels	Facilitate climate action through carbon footprint mitigation and global decarbonisation efforts for corporates and governments
Unit type	Emissions allowances	Carbon credit
Geography	Local/jurisdiction	Global
Issuer	Regional/national/sub-national regulatory bodies	Carbon project developers (e.g., developer of a wind farm)

Source: Standard Chartered

Fig. 2

Carbon credit lifecycle



Source: Standard Chartered

Current trends in carbon markets

According to the World Bank's latest carbon market report, there are around 37 emissions trading systems (ETS) and 43 carbon taxes, which collectively cover about 28% of global GHG emissions.

- Companies across the world are committing to the net-zero initiative owing to regulatory, strategic and financial reasons. Around 55 national jurisdictions and 44 subnational jurisdictions have a carbon pricing system. Emerging economies such as India, Indonesia and Vietnam are actively developing ETS frameworks.
- Carbon markets help mobilise funds and ensure developmental outcomes even amid economic uncertainties. Carbon savings are in fact expanding their impact beyond just reducing emissions. As their scale increases, they can deliver long-term benefits such as affordable energy, clean cooking fuels and a healthier environment.
- Novel insurance products from Multilateral Investment Guarantee Agency (MIGA) now offer political risk guarantees for carbon market investments, addressing key challenges such as cross-border regulatory uncertainty and expropriation. This makes international carbon market investments safer and improves investor confidence.
- Compliance markets continue to dominate carbon markets. In 2024, close to USD 950bn worth of allowances were traded covering over a quarter of global emissions. The EU ETS alone generated EUR 648bn in secondary trading in 2023, largely through derivatives.
- The project-based markets had a reported transaction value of around USD 535m in 2024 (a 29% drop from 2023 levels). It continues to face challenges related to market integrity and pricing. Currently, there is a shift toward higher-quality credits, and that market is experiencing growth alongside higher prices.

Why revisit carbon markets?

With the rise in large green deals, a growing number of companies committing to net-zero targets and the introduction of national climate financial packages, there has been robust demand in carbon markets.

This asset class is establishing a prominent footprint and becoming a fundamental mechanism to mobilise and channel funds within the global financial ecosystem. Early entry into this market could be seen as attractive as the asset class matures and scales. **Some prominent potential drivers of these markets in the near term are:**

EU climate and energy package and Social Climate Fund

In the compliance markets, the EU ETS represents the largest portion of traded value, accounting for over 74% of the market size in 2024. The EU's climate and energy package for 2026, along with the creation of the Social Climate Fund (SCF), is expected to further support its emissions trading scheme. The SCF is expected to raise nearly USD 94bn for the EU between 2026 and 2032. This, however, includes 25% co-financing from member states. The existing EU ETS is becoming tighter, with fewer free allowances and inclusion of new sectors such as shipping, road transport and buildings, and the compliance markets look likely to expand their scope over the next few years.

Carbon Border Adjustment Mechanism

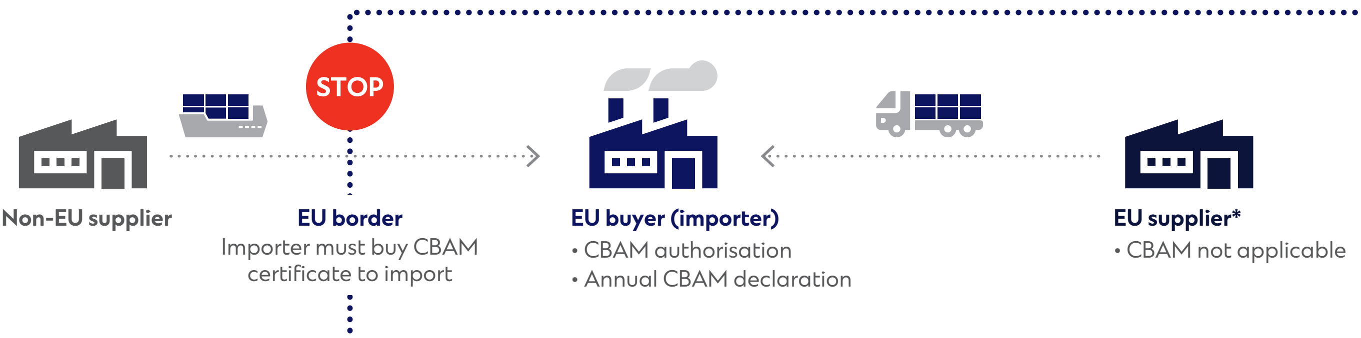
With the full implementation of the Carbon Border Adjustment Mechanism (CBAM) beginning in 2026, EU importers will be required to purchase CBAM certificates reflecting the carbon intensity of their imported goods, after accounting for carbon prices already paid in the country of origin. As a regulation and not a directive, CBAM is enforceable by law across all EU member states. This framework creates an efficient and unified cross-border carbon pricing mechanism that would encourage other countries to adopt similar frameworks to remain competitive. The primary objective of CBAM is to plug 'carbon leakage' by preventing the relocation of carbon-intensive production to jurisdictions with laxer emissions controls, only for those goods to be re-imported for consumption.

By imposing a carbon price on imports equivalent to that faced by EU producers, CBAM creates a level playing field. CBAM is likely to have a direct impact on compliance and project-based carbon markets

Fig. 3

How does the CBAM work?

EU carbon border adjustment mechanism simplified illustration



Source: Standard Chartered
Note: *Including goods originating from Iceland, Liechtenstein, Norway and Switzerland

Expansion of compliance markets in emerging economies

Emerging Markets (EMs) are likely to see strong growth owing to emerging compliance carbon markets, along with the expansion of various emission trading schemes. For example, China and Brazil are scaling their ETS and carbon taxes. China is expected to expand its carbon sector coverage by including chemicals, petrochemicals and aviation in 2027 and introduce tighter benchmarks and stricter allocation rules. Starting in 2026 and over the next several years, Brazil plans to establish a fully functional monitoring, reporting and verification (MRV) framework for carbon emissions across regulated companies and installations. The next year will also see new compliance market launches, notably in India. India's compliance market will cover nine sectors, with plans to include coal-fired power generation at a later stage.

Recent growth projections suggest the global compliance carbon market is entering a new phase of institutional maturity and will see significant growth, potentially reaching a trading value of USD 4.41trn by 2030. Compliance markets are increasingly complemented by a voluntary domestic offset mechanism. In India, non-obligated entities can register eligible projects for GHG emissions reduction, removal or avoidance against the baseline for the issuance of carbon credit certificates. This is meant to help incentivise emissions reductions from companies falling outside the nine targeted sectors.

Overall, the accelerated growth in carbon markets is likely to be driven mainly by EMs, where over 11 jurisdictions have ETS frameworks under development (likely launching from 2026) and 9 others are considering introducing ETS within their jurisdictions.

Fig. 4

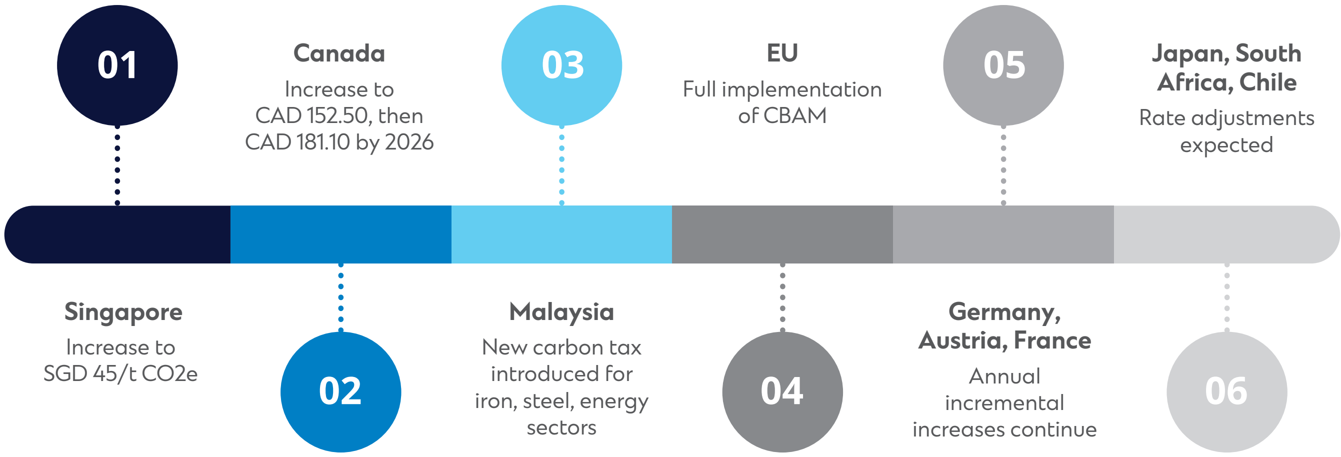
ETS status worldwide

Source: Standard Chartered, The World Bank

Carbon taxes are imposed by governments on GHG emissions, typically charged per tonne of CO2e. The objective is to encourage polluters to reduce their carbon footprint and become more eco-conscious. The World Bank's 2025 report mentions that carbon taxes are now implemented in 43 nations worldwide, covering a significant portion of global emissions. Several economies, particularly in Asia Pacific and Latin America, are either introducing new carbon taxes or planning to raise existing carbon taxes in 2026. Singapore's carbon tax will increase from its current SGD 25/tonne of CO2e to SGD 45/tonne of CO2e in 2026, and its carbon tax is planned to reach between SGD 50/tonne and SGD 80/tonne by 2030. Similarly, Malaysia has announced the introduction of a new carbon tax in 2026, focusing initially on the iron, steel and energy sectors.

Fig. 5

Proposed changes in carbon taxes in 2026



Source: Standard Chartered, The World Bank

Hybrid carbon markets

Compliance markets are being increasingly complemented with project-based mechanisms. For example, in Singapore, corporates subject to the carbon tax can offset up to 5% of their exposure to the tax with specific high-quality project-based carbon credits. A similar mechanism is in place in China and South Africa, with other countries such as Vietnam also considering this hybrid mechanism.

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) scheme is a compliance scheme specifically designed for airlines established by The International Civil Aviation Organisation (ICAO). CORSIA works by requiring airlines to purchase specific project-based carbon credits for emissions over and above their given baseline based on 2019 emission levels. The scheme is currently in phase 1 (2024-2026) and is not mandatory. However, over 120 countries have signed up to this phase. The current demand forecast for CORSIA eligible carbon credits in phase 1 is estimated to be 210-230m tonnes; currently, there is limited supply to meet this demand.

Increased buying activity and opening of large markets in project-based markets

Beyond corporates purchasing carbon credits, governments are increasingly entering the market as buyers. Singapore announced in September 2025 that it would buy about SGD 76.4m worth of carbon credits from international projects in Ghana, Peru and Paraguay. As governments look to meet their national climate targets, we expect carbon markets to feature among their strategies as a complement to local decarbonisation actions to achieve net zero.

The project-based markets, which is smaller in size, was valued at USD 1.7bn in 2024 and is likely to grow by around 25% between 2025 and 2034, driven by the opening up of new markets.

A recent anticipated development in the project-based markets was the opening up of Indonesia's carbon markets. Indonesia inked a memorandum of understanding with the Integrity Council for the Voluntary Carbon Market (ICVCM), an independent governance body for the market, in November 2025. The Indonesian government estimates a carbon trading potential of around 13.4bn tons of CO2e (total tradable carbon credit potential across both compliance and voluntary markets) between 2024 and 2050. With an average carbon price of USD 15/ton, the annual economic potential can reach approximately USD 7.7bn.

How can investors participate?

Carbon markets are no longer about regulatory obligations. They have emerged as a significant investment story. With evolving regulations and increasing demand for carbon credits, carbon markets now offer investment potential that extends beyond traditional commodities. Reducing carbon footprint is becoming a part of ESG discussions and alternative investment strategies. **Individual investors can participate in carbon markets in a few ways:**

Exchange-traded funds (ETFs)

Carbon market ETFs are based on compliance markets and are built around the trading of carbon credits or allowances. These ETFs typically track the allowances issued under major cap-and-trade programmes like the European Union Allowances (EUA), California Carbon Allowances (CCA) and Regional Greenhouse Gas Initiative (RGGI) through futures contracts.

Outcome bonds

Outcome bonds are tied to specific project-based credits and have well defined goals. For example, a carbon outcomes bond could be tied to the delivery of carbon credits from projects that reduce deforestation and reduce a quantified amount of carbon emissions. They appeal to investors who are focused on their investment's impact.

Structured notes

Carbon-themed structured notes are investments that have their underlying assets linked to a carbon ETF. Some of the notes may have a lock-in and are usually designed to be held till maturity and, hence, may lack liquidity.

Private equity funds

While there are no dedicated carbon market private equity funds yet, there are some funds that include carbon markets as one of their investment themes, such as broader forestry funds.

Direct investments

This involves investing in companies that primarily focus on buying and selling carbon credits or have their own carbon projects. These investments are, however, generally less diversified and riskier.

What are the key risks and considerations?

Quality

Concerns over quality have impacted prices of carbon credits and given rise to greenwashing concerns.

Price volatility has been a key risk for investors in the project-based markets. According to data from the World Bank, some reforestation projects aimed at absorbing carbon have failed due to forest fires or land-use changes, while other credits have been affected by sudden changes in government policy, rendering credits either invalid or decreasing their value.

Lack of standardisation

The current lack of standardisation makes it difficult to verify the quality of credits, and this can erode market confidence. However, work is in progress around this, spearheaded by initiatives, such as The Integrity Council for the Voluntary Carbon Market and its Core Carbon Principles, which ensure credits are of the highest quality. Significant progress has been made in recent years to develop overarching rules, practices and standards within global carbon markets. Scaling carbon markets is likely to generate considerable cross-border financing for Emerging Markets and Developing Economies (EMDEs), providing a critical funding stream for climate finance in markets where more traditional finance is hard to secure.

Regulatory and policy risk

Regulatory and policy risk is paramount in carbon markets, as policies and compliance frameworks are constantly evolving and could render carbon credits invalid or reduce their value. Although insurance products such as MIGA guarantee mitigation of cross-border political risk, inconsistent standards across jurisdictions and shifts in government priorities or policies can directly impact the issuance, pricing and validity of carbon credits.

Do carbon markets fit into your wealth journey?

Investors with complex portfolios can benefit from inclusion of carbon market investments as they can build wealth with impact. In fact, a survey found that about 90% of UHNWI investors expressed keen interest in sustainable investing and planned to increase their exposure in the future.

Carbon can be a **portfolio diversifier,** owing to its low correlation with traditional assets. This is because carbon markets are driven by a unique set of factors, such as emission caps, climate targets and regulatory policies, to name a few, rather than by typical macroeconomic factors such as interest rates and corporate earnings.

The asset class is relatively new, offering a new risk-return dimension. Their inclusion in a sustainability-focused portfolio can improve risk-adjusted returns, especially when combined with traditional assets. A study analysed the correlation of climate-aware assets (e.g., carbon efficient, green bonds, fossil fuel, clean energy, S&P 500 sustainability index, ESG, real carbon price index) and traditional assets (e.g., gold, agriculture commodities, corporate bonds, S&P 500, GSCI commodities, oil). It found that climate-aware assets, including carbon market investments, exhibited low or negative correlations with conventional investments such as gold, bonds, agricultural commodities and oil. This reinforces the role of climate-aware assets such as carbon allowances and clean energy as a key diversifier in a portfolio.

Fig. 7

Correlation matrix

	Carbon efficient	Green bond	Fossil fuel	Clean energy	Sustainability index	ESG index	Gold	Agricultural commodities	Corporate bonds	S&P 500	GSCI commodities	Oil	Carbon price index
Carbon efficient	1.00												
Green bond	0.23	1.00											
Fossil fuel	1.00	0.23	1.00										
Clean energy	0.55	0.28	0.55	1.00									
Sustainability index	0.99	0.23	1.00	0.55	1.00								
ESG index	0.96	0.35	0.95	0.58	0.95	1.00							
Gold	–0.10	0.33	–0.11	0.19	–0.11	–0.05	1.00						
Agricultural commodities	–0.03	–0.07	–0.04	0.07	–0.04	–0.01	0.29	1.00					
Corporate bonds	0.25	0.97	0.26	0.31	0.25	0.40	0.32	–0.02	1.00				
S&P 500	0.99	0.24	0.99	0.54	0.99	0.95	–0.10	–0.01	0.27	1.00			
GSCI commodities	0.09	–0.06	0.06	0.15	0.06	0.13	0.33	0.62	0.01	0.09	1.00		
Oil	0.03	–0.03	0.01	0.10	0.01	0.07	0.27	0.50	0.02	0.04	0.88	1.00	
Carbon price index	0.21	0.11	0.21	0.04	0.20	0.28	–0.02	–0.18	0.13	0.23	–0.06	–0.04	1.00

Source: Standard Chartered, Journal of Sustainable Finance & Investment (2025)

Carbon credits can be an asset for **wealth preservation** as their value is fundamentally linked to global decarbonisation efforts and regulatory demand, rather than short-term market cycles. This feature makes them resilient and enhances their ability to maintain purchasing power over time. Consequently, UHNWIs are increasingly seeking alternative investments that offer both financial returns and a positive impact on the planet. Within the carbon market, there are a range of options that support this dual objective. Investors can make an informed decision by being aware of their features and risk-return profile.

- **Timberland (managed forestland)** offers a compelling mix of steady yields, carbon credits and inflation protection. They are being viewed as long-term wealth preservation assets as timber production from trees is predictable, leading to a steady income stream while the land value continues to appreciate over time. Additionally, forests act as carbon sinks, creating tradable credits that align with global decarbonisation goals.
- **Blue carbon projects** restore mangroves and seagrass, which store up to four times more carbon than forests. These projects generate premium credits and deliver co-benefits like coastal protection and biodiversity. Preserving and rebuilding blue carbon environments lead to meaningful climate change mitigation, alongside the creation of meaningful jobs, coastal resilience and wildlife habitats.
- **Biochar initiatives** lock carbon in soil for centuries, creating one of the most durable carbon removal solutions. They also improve soil health and crop yields, thereby increasing return on investments.

By 2030, carbon credits may exceed USD 50bn annually, driven by regulatory tightening and expanding corporate net-zero commitments. The limited supply of high-quality credits creates scarcity value, positioning them as store of value similar to art and real estate.

There is increased interest to integrate carbon credits into wealth portfolios against the backdrop of an evident shift among sophisticated investors to inculcate climate stewardship within their legacy. Permanence is critical for multigenerational wealth strategies, as it aligns with long-term goals, safeguards integrity and future value of the estate. Carbon investments with permanence, such as biochar and afforestation, ensure that the impact on environment remains intact across multiple generations. This stability also protects the financial premium attached to premium carbon credits and enhances the reputational value for families aiming to create a lasting legacy.

How to manage risk with carbon derivatives?

Carbon derivatives are contracts such as futures, options and swaps that derive their value from carbon credits or allowances. While they are structurally similar to equity derivatives, their underlying assets and market dynamics are more closely aligned with commodity derivatives.

These instruments help in hedging both compliance obligations and sustainability risks, whereas equity derivatives focus primarily on stock price risk and investor returns. From the perspective of liquidity and market maturity, equities are far ahead of carbon markets. However, there is growing traction in carbon derivatives among companies and investors owing to their role in managing risk exposures in complex portfolios.

Price volatility

Carbon prices can swing sharply due to factors such as energy shocks, supply shortages and policy changes. Derivatives help mitigate these price swings efficiently. Futures contracts allow investors to lock in carbon prices today for future delivery, reducing exposure to sudden price spikes. Options provide the right (not the obligation) to buy or sell allowances at a pre-determined price, essentially offering protection against unfavourable market movements.

Regulatory compliance planning

Companies operating under cap-and-trade systems can use carbon derivatives to secure allowances in advance and avoid price surges later. Futures and swaps help to ensure firms meet compliance requirements without exceeding their budget.

Transparency and liquidity

Derivative markets promote transparency by providing forward price signals on carbon, making it easier for investors to compare voluntary credit prices with compliance benchmarks. This helps firms plan their carbon strategy better and regulators to devise effective carbon price controls. Compared to physical credits, derivatives allow quick adjustments and liquidation of positions.

Cross-border risk

Derivatives allow companies and investors to hedge against price volatility and regulatory uncertainty in different jurisdictions. For example, ahead of Singapore's planned carbon tax increase to SGD 45/ tonne of CO_2e in 2026, firms can lock in current prices through futures or options, reducing exposure to unexpected cost spikes when the new tax takes effect.

How is technology reshaping carbon markets?

Technology is having a transformative impact on carbon markets. Digital platforms and blockchain are significantly enhancing transparency and traceability, reducing fraud and boosting investor confidence. Key innovations such as real-time tracking and automated verification are driving efficiency, scalability and liquidity, making carbon markets increasingly accessible and reliable for investors.

Carbon markets are susceptible to opacity, fraud and double counting. Blockchain technology creates immutable, decentralised ledgers for carbon credit transactions, ensuring traceability, transparency, fraud prevention and liquidity.

AI-driven frameworks enable accurate and bias-free prediction of carbon capture potential and automate fraud detection. Monitoring, Reporting and Verification (MRV) systems that are augmented with AI can reduce cost, effort and resources. They are also capable of elevating outcomes. For instance, AI simulations in eco-friendly farming can help improve soil quality and biodiversity, leading to better crop yields.

IoT sensors and satellite imagery provide real-time, auditable data on emissions and land use. For instance, in a forestry project, IoT sensors can help measure soil moisture and tree growth on a real-time basis. Buyers can verify the project's performance and carbon capture instantly, reducing fraud and speeding up credit issuance.

Platforms such as Carbonmark and EcoRegistry use blockchain to create liquidity pools, leading to increased flexibility and liquidity in carbon markets.

The foremost benefit of technology is its ability to enhance transparency and interoperability. The World Bank's estimates indicate that carbon markets could potentially save USD 250bn annually by 2030 with improved transparency and interoperability. With technological advancements, carbon markets are well positioned to reach a new trajectory of transparency, impact and scalability.

Conclusion

There is a role that carbon markets can play in a company's decarbonisation journey, and there are meaningful ways for investors to be involved in this theme. However, it is important for investors to evaluate the risks and considerations across the range of solutions available, and align expectations from a risk, return and impact perspective.

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