Carbon trading

An emerging commodity class

February 2025

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CONTENTS

01

Executive summary

The past year witnessed the highest global average temperature ever recorded, surpassing the pre-industrial average by 1.45 ± 0.12°C[1]. This alarming trend underscores the pressing need for robust climate action. As governments and businesses intensify efforts to mitigate the impacts of climate change, carbon markets have become a central mechanism for reducing greenhouse gas (GHG) emissions. The expansion of Emissions Trading Systems (ETS) and Voluntary Carbon Markets (VCM) is transforming how companies manage their carbon footprint while balancing financial performance and regulatory compliance.

The rapid growth of these markets, driven by stricter emissions caps, rising carbon prices and organizational commitments to net-zero targets, present both opportunities and challenges. Companies must navigate the complexities of price volatility, regulatory changes and liquidity constraints while integrating carbon trading into broader sustainability and risk management strategies.

By understanding these dynamics, companies can not only meet regulatory requirements but also seize opportunities for financial and operational benefits. A strategic approach to carbon trading, incorporating risk management, market positioning and sustainability alignment will be key to navigating this complex landscape and unlocking long term value.

[1] State of the Global Climate 2023 (wmo.int)

02

Carbon trading: What is it?

Carbon trading is a market-based approach designed to reduce greenhouse gas emissions by providing economic incentives for companies to lower their carbon footprint. At its core, the process of buying, selling or exchanging credits (where one credit typically represents the right to emit one ton of carbon dioxide or its equivalent GHGs) that allow holder to emit CO_2 or any other greenhouse gas is called as Carbon Trading. A company with high emissions can buy allowances from a low emission company. If the carbon price is high, then the company can incentivize from the investments into emission reduction. This system creates a financial value for emissions, encouraging businesses to innovate and invest in cleaner technologies and accelerate decarbonization.

The significance of carbon trading has been magnified by international agreements, particularly the Paris Agreement, which aims to limit global warming to below 2°C, with efforts to restrict the increase to 1.5°C[2,3] . Adopted in 2015, the Paris Agreement has introduced a global shift toward carbon markets by mandating that countries develop their own Nationally Determined Contributions (NDCs). These commitments not only encourage nations to reduce their emissions but also foster collaborations and investment in carbon trading mechanisms.

Cap and trade market coverage across geographies

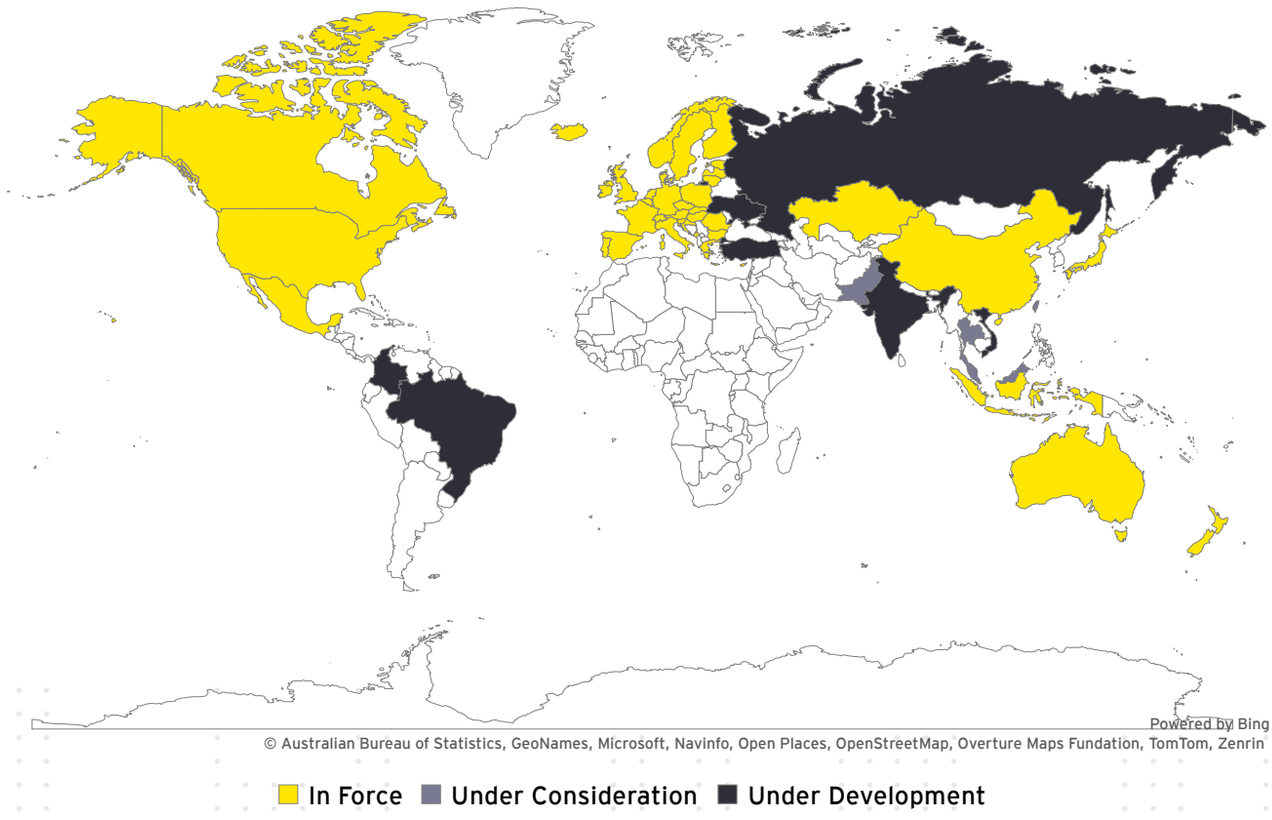


Figure 1: Cap-and-Trade market coverage across geographies[4]. The yellow region displays countries where Cap-and-Trade is currently operational, while the gray and black regions denote, respectively, the regions where Cap-and-Trade is either under consideration or under development.

[2] The 1.5 C climate threshold: What it means and why it matters | World Economic Forum (weforum.org)
[3] The Paris Agreement | UNFCCC
[4] Source: ICAP. (Multiple intra-country ETS systems have been assumed to exist with the most mature system considered for visual simplicity)

Jurisdiction	Type	Emissions shared	Applicable industry
UK	National ETS	28%	E, I, M
China	National ETS	32%	I, T, B
EU	Regional ETS	38%	E, M, T, B, A
Germany	National ETS	39%	I, M
New Zealand	National ETS	48%	E, I, M
Fujian	State ETS	51%	E, I, M
Washington	State ETS	70%	I, M, T, B, A
California	State ETS	76%	E
Quebec	State ETS	79%	E, I, M, T, A, B, W
Korea	National ETS	89%	E

Table 1: Major markets with Carbon Markets in force as of 2023[5] where E – Electricity, I – Industry, M – Mining, T – Transport, B – Buildings, A – Agriculture, Av – Aviation, W - Waste

In this context, two primary carbon trading markets have emerged: Emissions Trading Systems (ETS), which operate as compliance markets, and Voluntary Carbon Markets (VCM), where businesses can choose to participate in carbon trading to meet self-imposed sustainability goals.

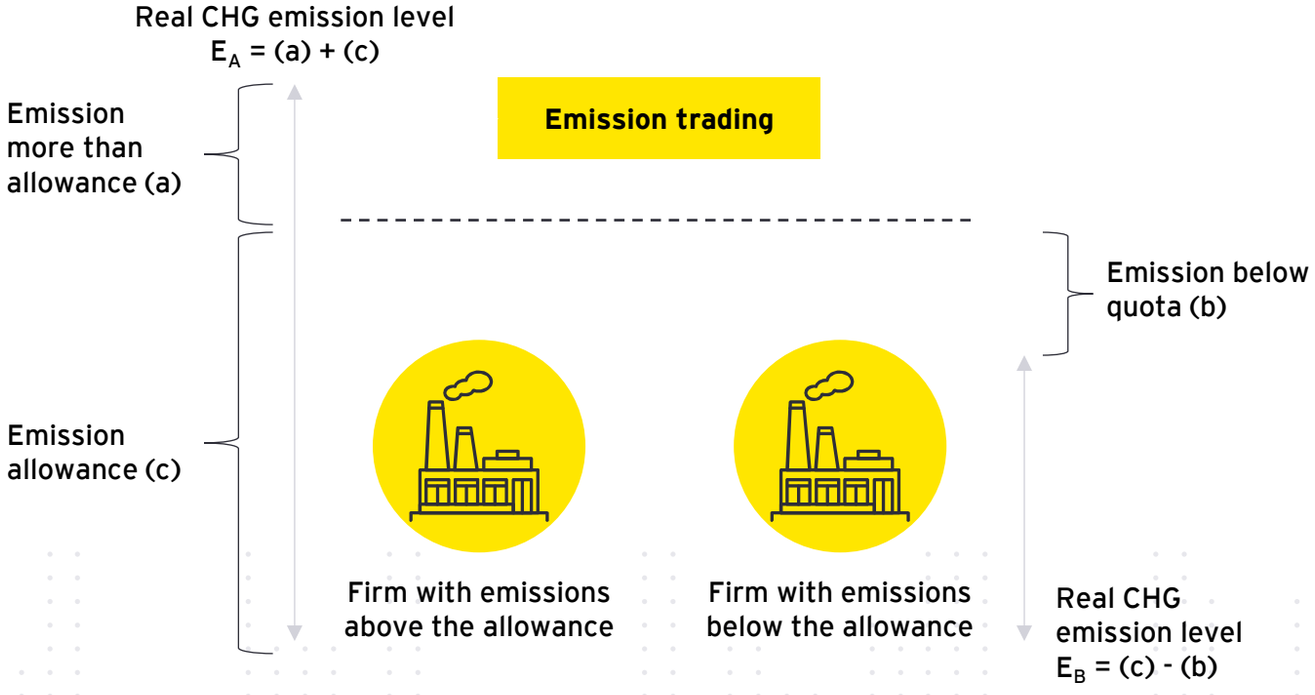


Figure 2: Process Flow of Carbon Trading: Total Carbon Credits (CCs), amounting to CCB (MtCO2e) = (c) – EB, are issued to firm with CHG emissions below the allowance. These credits can be subsequently sold to firm with emissions exceeding the allowance. In the representation, the latter firm must purchase total credits equivalent to CCA (MtCO2e) = EA – (c).

[5] Source: World Bank

2.1

Emissions trading systems (ETS): Compliance markets

Emissions Trading Systems (ETS) are regulatory frameworks established by governments to control and reduce GHG emissions from specific sectors. The most prominent example is the EU Emissions Trading Systems (EU ETS), which covers approximately 40% of the EU's emissions and has been operational since 2005. Under this system, a cap is set on total emissions allowed from participating entities and companies are allocated or can purchase emission allowances. If a company emits less than its allowance, it can sell surplus to others.

The EU ETS has undergone significant reforms to strengthen its impact, including the introduction of Market Stability Reserve (MSR) to address surplus allowances and support carbon price stability. In 2023, carbon prices in the EU ETS reached €100 per ton[6], reflecting a robust demand for allowances (refer to Chart 1). This upward trend is also driven by the European Green Deal, which aims for the EU to become climate neutral by 2050. While prices have since come down in recent past due to Europe's ongoing transition to renewable energy, leading to a decrease in demand for emissions allowances. This reduction in emissions, especially in the power sector, has eased the pressure on utilities to hedge their carbon exposure. Furthermore, an increase in the availability of allowances, partly due to EU's RePowerEU initiative has created a temporary oversupply in the market[7]. However, going forward, the prices are only likely to increase as the current prices are not reflective of the ambitious goal as laid down by the Paris Agreement. Estimates for optimum carbon prices suggest that the uniform global carbon prices ought to be higher with the prices between US$50 and US$100 for the year 2030[8].

Beyond pricing, the EU ETS has evolved into a substantial financial market characterized by significant trading volumes, open interest, and moderate volatility. In 2023, the total trading volume in the EU ETS reached €881 billion, with €770 billion attributed to EU Allowances (EUAs), representing a 553% growth[9] over recent years. This robust trading activity underscores the market's liquidity and efficiency, enabling participants to execute transactions with ease.

The market's depth is further evidenced by daily trading volumes, averaging about €3 billion for spot contracts and approximately ten times that amount for futures contracts. This high level of activity reflects the diverse participation of compliance entities, financial institutions, and investment firms, all contributing to the market's dynamism.

Regarding volatility, EUAs exhibit moderate levels compared to other asset classes. In 2023, the 90-day average volatility of EUA daily returns was approximately 2.24%[10]. This is relatively low compared to commodities like natural gas or coal, which can experience more significant price swings, though higher than traditional financial instruments such as government bonds. This moderate volatility indicates that while EUA prices can experience short-term fluctuations due to factors like energy prices and weather conditions, they tend to follow a clearer appreciation trend over the long term.

The EU ETS's expansion and the increasing involvement of various market participants have enhanced its role as both a policy tool and a financial market. The system's design, characterized by a predictable supply of allowances and a dynamic demand influenced by multiple factors, contributes to its moderate volatility and robust trading volumes. As the EU continues to pursue its climate objectives, the EU ETS is expected to play a pivotal role in driving emissions reductions while functioning as a significant financial market.

[6] EU carbon hits 100 euros taking cost of polluting to record high | Reuters
[7] EU ETS price slump: The spectre of oversupply haunting Europe - Carbon Market Watch
[8] Drupp et. al. (2024), American Economic Review Vol. 16
[9] Source: ICAP (The prices for EU-ETS were originally denominated in EUR and have been, for comparison, converted to USD using the monthly average EUR/USD exchange rates)
[10] Owing to different data frequency between the two data-sets, the data points have been linearly interpolated to have their frequencies matched

Chart 1. Historical Price trend of EU ETS and California Cap & Trade [11,12]

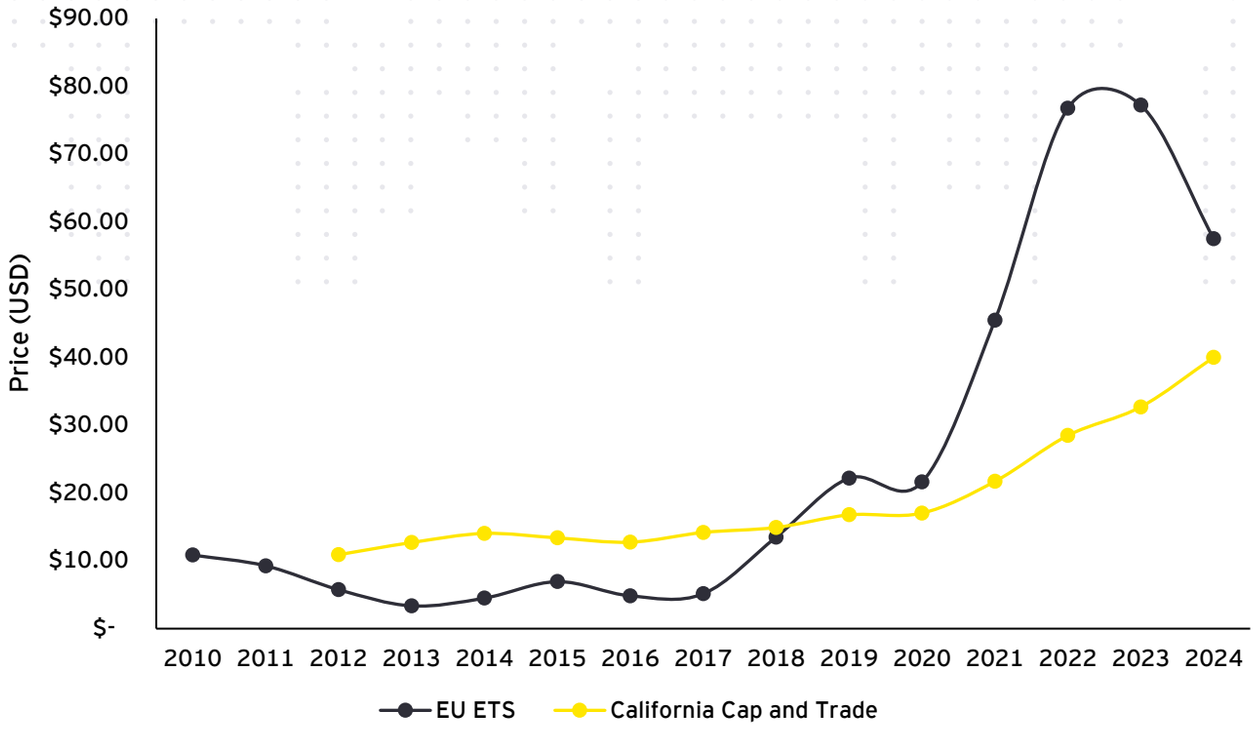
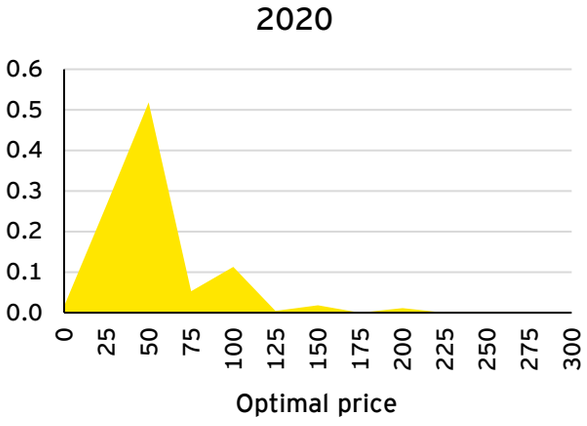
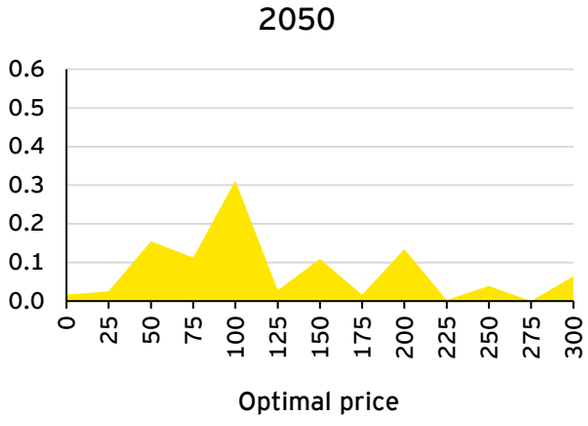
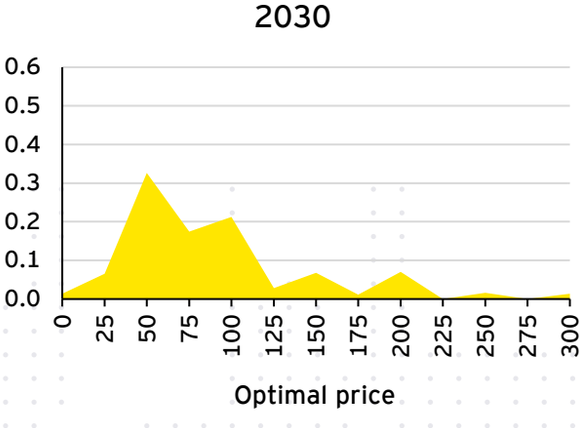


Chart 2: Estimated Global Carbon Prices (USD)[13]





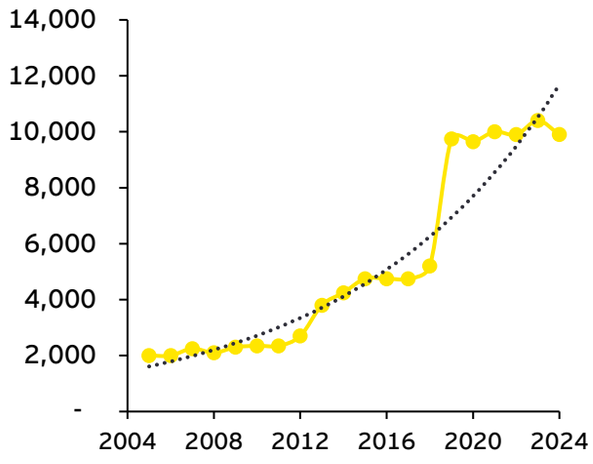


Note: The figure contains global carbon price estimates produced by leading experts using a heterogeneity of optimal price models. The x-axis displays the prices for the year 2020, 2030, and 2050, while y-axis reports the proportion of estimates. While there is heterogeneity in price estimates, with larger variation increasing with forecast period, there is nevertheless an agreement amongst experts suggesting that optimal prices ought to be more than the current prices.

[11] Source: ICAP (The prices for EU-ETS were originally denominated in EUR and have been, for comparison, converted to US$ using the monthly average EUR/US$ exchange rates)
[12] Owing to different data frequency between the two data-sets, the data points have been linearly interpolated to have their frequencies matched
[13] Chart from Drupp et. al. (2024), American Economic Review Vol. 16

The evolving structure of ETS is pushing companies to rethink their long-term strategies. With the annual reduction of allowances in the EU ETS's Phase 4 (2021-2030), the market will tighten further, raising overall cost of emissions. Additionally, the introduction of the Carbon Border Adjustment Mechanism (CBAM), which will impose carbon costs on imports to EU, further increasing the stake for businesses both within and outside the EU.

Chart 3. Emission Coverage (in MtCO2e)[14]



Note: The growth between 2019 and 2020 was led by the inclusion of China's ETS coverage. The dotted line represents the trend of exponential growth over the past two decades.

Chart 4. EU ETS trading volumes[15]

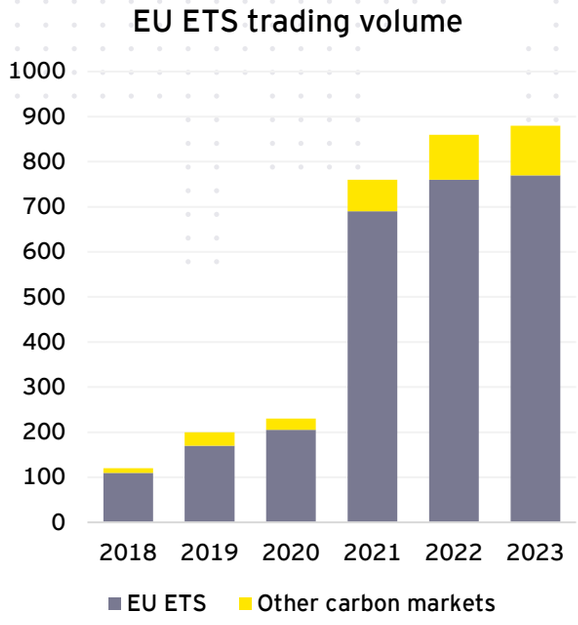
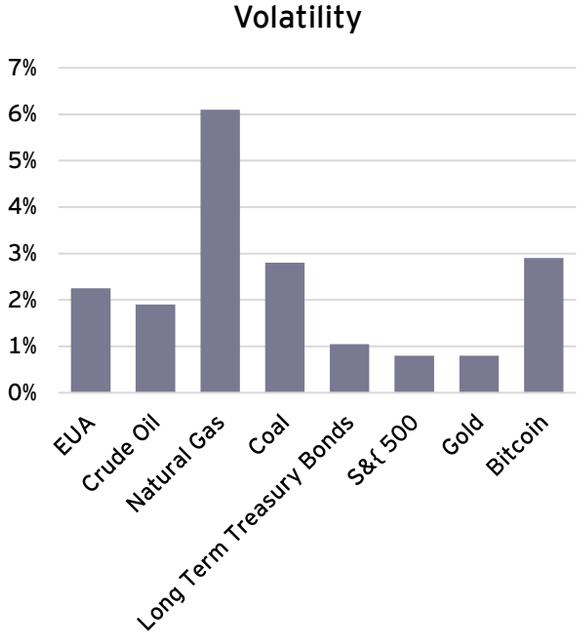


Chart 5. EU ETS volatility[16]



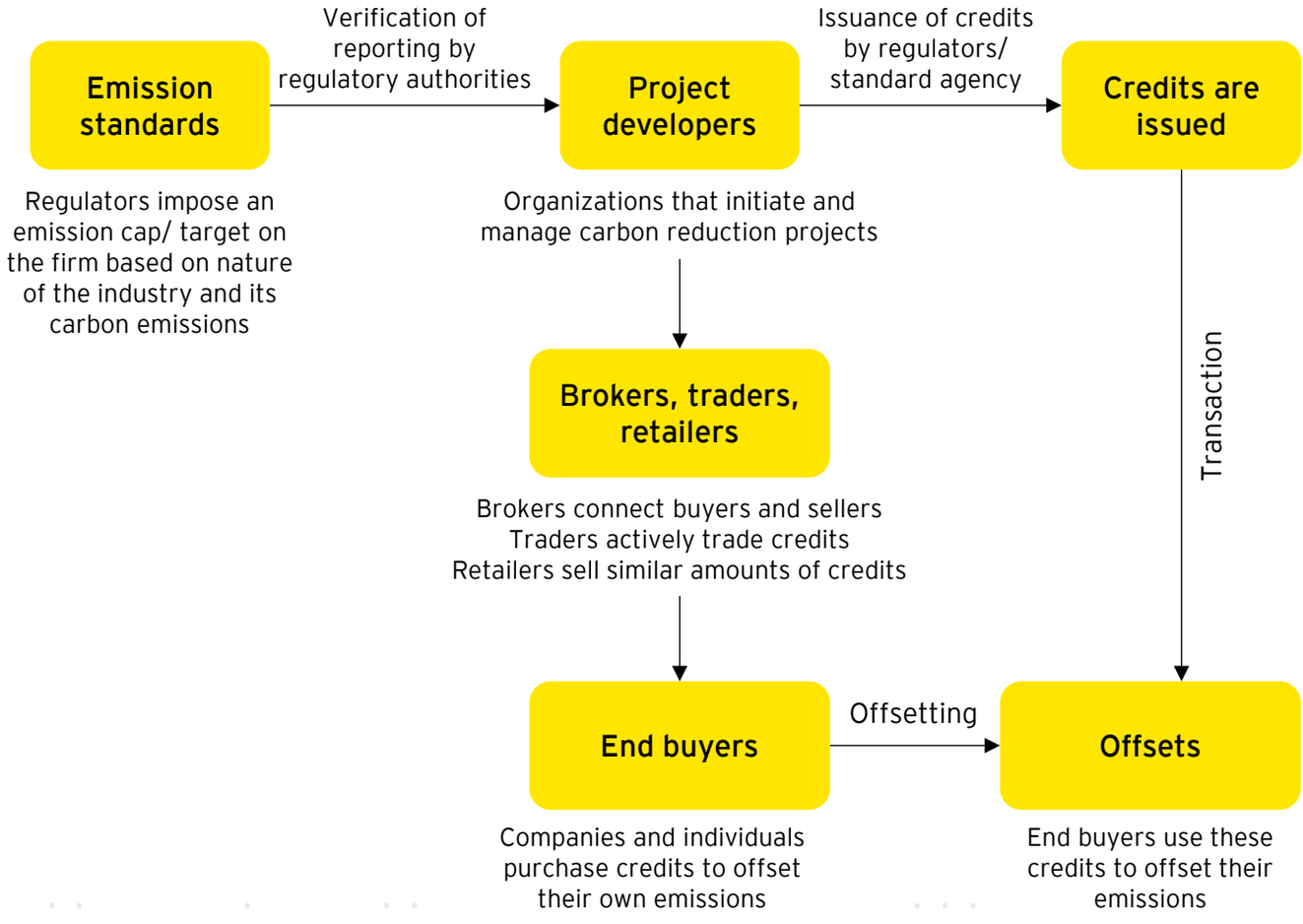
[14] International Carbon Action Partnership (ICAP) Report, 2024
[15] Homaio - How big is the EU ETS as a financial market?
[16] Homaio - Is the EU ETS a volatile market?

2.2
Voluntary carbon markets (VCM): A growing segment

Voluntary Carbon Markets (VCM) allows companies and individuals to purchase carbon credits on a voluntary basis, independent of regulatory requirements. This market has gained traction as organizations increasingly commit to net-zero emissions and seek to offset their carbon footprint. The VCM surpassed US$2 billion in market value in 2023, driven by demand for credits from renewable energy, forestry and land-use projects. The market is expected to continue growing as more companies commit to their carbon neutralities goals.

A critical aspect of the VCM is the emphasis on the quality and integrity of carbon credits. Various standards and certification processes have emerged to ensure that credits represent genuine, measurable and permanent emissions reductions. Organizations such as the Integrity Council for the Voluntary Carbon Market (ICVCM) are actively working to establish frameworks that enhance credibility and transparency.

Figure 3. Process flow of voluntary carbon-trading market (VCM)



The growth of the VCM market is projected to reach US$50 billion by 2030[17]. This growth is driven by over 1200 major companies committing to net-zero targets, increasingly leveraging VCM to meet their goal. A significant portion of VCM transactions – around 40%, are focused on nature-based solution, which not only seize large amounts of CO2 but also align with biodiversity and social impact objectives. Despite varying prices from US$2 to US$50 per carbon credit depending on the project, VCM provides cost effective solutions for organizations aiming to bridge the gap between current operations and long term-sustainability targets.

[17] TSVCM_Report.pdf (iif.com)

03

Trends and challenges in carbon trading

Carbon trading has emerged as a pivotal mechanism in the global effort to mitigate climate change by incentivizing the reduction of greenhouse gas emissions. However, despite its potential, the carbon market faces a myriad of challenges that can undermine its effectiveness and credibility. As a strategic lever for climate policy, it is imperative to address these issues head-on to ensure that carbon trading can deliver on its promise of a sustainable and low-carbon future.

3.1

Technological changes

In the rapidly evolving landscape of carbon markets, technology plays a crucial role in ensuring that these mechanisms function efficiently and transparently. At the heart of the issue is the need for a unified digital infrastructure. Currently, carbon markets are fragmented, with disparate systems that struggle to communicate with one another. This lack of standardization can lead to the double counting of emissions reductions and injects a level of uncertainty that can deter market participation and investments[18].

Moreover, the verification of emission reductions remains a sticking point. Despite advances[19] in monitoring technologies, there is still a heavy reliance on self-reporting and periodic audits. This gap opens the door to data inaccuracies, which can skew emissions profiles and compromise the integrity of carbon credits.

Emerging technologies like blockchain are often touted as a silver bullet for these transparency and traceability issues. Yet, the reality is that blockchain is still in its trial phase within carbon markets, and questions around its energy use, scalability, and regulatory fit are yet to be fully addressed.

Cybersecurity also remains a top concern. As carbon markets digitize, they become more vulnerable to cyber threats that could compromise sensitive data and disrupt trading activities, leading to financial loss and reputational damage.

In 2022, we saw the launch of several blockchain-based carbon platforms, such as CarbonPlace, which aims to streamline carbon credit transactions and enhance market liquidity. These innovations have the potential to reduce transaction costs, making carbon trading more accessible for smaller businesses while increasing trust in credit quality. While such platforms are a welcome addition, there is still a long way for carbon markets to fully mitigate these challenges.

[18] Carbon markets: the challenges and opportunities | UBS Global
[19] Recommendations_for_the_Digital_Voluntary_and_Regulated_Carbon_Markets.pdf

3.2

Liquidity challenges and market fragmentation

Despite the rapid expansion of carbon markets, liquidity remains a key concern, particularly in VCM. The fragmented nature of the market, where different registries and standards apply, creates inefficiencies and leads to pricing discrepancies. For example, while the EU ETS benefits from high liquidity and price stability due to its long-established infrastructure, voluntary markets are far more variable. In 2022, the price of carbon credits in VCM ranged from US$3 to US$20 per ton, depending on the project type, region, and verification standard.

The voluntary carbon market (VCM) is particularly susceptible to volatility. The absence of a centralized governing body or unified set of rules leads to a patchwork of standards and verification processes, which in turn results in a wide spectrum of credit prices and qualities. This variability can deter serious investment and participation from larger entities that seek the predictability and assurance provided by more regulated markets like the EU ETS. Furthermore, the lack of liquidity can make it challenging for buyers to purchase large volumes of credits without significantly affecting the market price, which can be a barrier to scaling up carbon offset strategies.

Efforts to standardize and integrate carbon markets globally are gaining momentum. The Taskforce on Scaling Voluntary Carbon Markets (TSVCM) is working toward establishing uniform standards to improve credit quality and market liquidity. However, until these efforts fully mature, businesses must carefully assess the liquidity of the markets they participate in and understand how price volatility may affect their trading strategies.

3.3

Uncertainty and complexity in regulatory environment

Carbon markets are inherently shaped by regulation, making them vulnerable to policy shifts. Given that the carbon trading is still not completely mature, the regulatory environment surrounding it is complex and ever evolving. With the introduction of mechanisms like the EU's Carbon Border Adjustment Mechanism (CBAM) and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), we witness a significant recalibration of compliance obligations and market dynamics. These policy instruments, while designed to steer industries towards a more sustainable trajectory, introduce a series of challenges that necessitate astute navigation and strategic foresight.

The CBAM, set to take effect in 2026, represents a landmark shift in how carbon emissions are accounted for in cross-border trade. This mechanism will require companies to pay a tariff on imports commensurate with the carbon emitted during production, effectively extending the reach of the EU's climate policies beyond its borders. The implications for businesses are far-reaching, as they will need to meticulously track the carbon footprint of their supply chains and potentially seek out lower-carbon alternatives to mitigate the financial impact of these tariffs. This regulatory pivot not only adds a layer of complexity to global trade but also underscores the growing intersection of climate policy and market competitiveness.

Similarly, CORSIA introduces a nuanced set of challenges for the aviation industry, demanding comprehensive emissions monitoring, reporting, and verification (MRV) processes to ensure compliance. The scheme's requirement for airlines to offset any growth in CO2 emissions above 2020 levels through the purchase of eligible emission units places an additional operational burden on carriers. As CORSIA becomes fully operational, airlines will be pressed to integrate carbon management into their strategic planning, balancing the cost of offsets against investments in more fuel-efficient technologies and sustainable aviation fuels.

For businesses engaged in carbon trading, these regulatory developments highlight the critical need for agility and adaptability. The ability to swiftly respond to policy changes, integrate new compliance requirements, and capitalize on emerging opportunities within carbon markets will be a defining factor in maintaining competitive advantage.

04

Hedging carbon price risk

In the evolving landscape of sustainability and CSR, carbon credits have emerged not only as tool for mitigating emission impacts, but also as an instrument for financial risk management.

While the current utilization is promising, there is substantial room to expand the role of carbon credits in hedging strategies. A study published in the Journal of Sustainable Finance & Investment highlights[20] that carbon credits can serve as effective hedging instruments against both regulatory risks and price volatility in energy markets.

At EY, we advocate for a strategic integration of carbon credits into corporate hedging frameworks to not only manage financial risks but also to drive sustainable value creation. Our analysis indicates that companies adopting this approach are better positioned to navigate the complexities of global carbon markets and regulatory landscapes.

4.1

Market instruments for hedging carbon price risk

The carbon markets have matured to offer a broad spectrum of financial instruments that enable companies to hedge against carbon price volatility and leverage trading opportunities. These instruments span across both compliance and voluntary markets, addressing the distinct needs of businesses operating under regulatory obligations or pursuing sustainability goals. Key market instruments include futures, options, swaps, forwards, exchange-traded funds (ETFs), tokenized carbon credits, debt-for-climate swaps, transition bonds, and sustainability-linked bonds. Each of these tools plays a critical role in helping firms manage their exposure to price fluctuations, optimize financial planning, and generate profits from market movements. By integrating these instruments into a comprehensive hedging strategy, companies can better position themselves to navigate the dynamic carbon market landscape and align their financial goals with sustainability objectives.

- **Carbon credit futures**

  Futures contracts obligate the purchase or sale of carbon credits at a predetermined price on a future date, enabling entities to hedge against price fluctuations.

  Example: The European Energy Exchange (EEX) offers futures contracts on EU Allowances (EUAs), facilitating compliance with the EU Emissions Trading System (EU ETS).[21]

- **Carbon credit options**

  Options provide the right, but not the obligation, to buy or sell carbon credits at a set price before a specified date, allowing for strategic positioning based on anticipated market movements.

  Example: The Intercontinental Exchange (ICE) lists EUA options, granting flexibility in managing exposure to carbon markets.[22]

[20] Full article: Carbon emissions and firm profitability (tandfonline.com)
[21] Carbon Markets: An Emerging Derivatives Class – MSCI
[22] Role of Derivatives in Carbon Markets – International Swaps and Derivatives Association

- **Exchange-Traded Funds (ETFs) and Exchange-Traded Commodities (ETCs)**

  These funds track the performance of carbon credit markets, offering investors exposure without direct involvement in futures or options.

  Examples:

  - KraneShares Global Carbon Strategy ETF (KRBN): Provides exposure to major carbon markets, including the EU ETS and California Cap-and-Trade Program.[23]
  - SparkChange Physical Carbon EUA ETC (CO2): Offers direct exposure to EUAs, allowing investors to participate in the carbon market's performance.

- **Carbon credit swaps**

  Swaps involve exchanging cash flows related to carbon credit prices, enabling parties to manage exposure to carbon markets without direct trading.

  Example: Financial institutions may engage in over the counter (OTC) carbon credit swaps to hedge against regulatory risks associated with carbon pricing mechanisms.

- **Voluntary carbon market derivatives**

  These derivatives are based on carbon credits from voluntary offset projects, allowing entities to hedge or speculate on carbon credit prices outside compliance markets.

  Example: The AirCarbon Exchange (ACX) introduced exchange-traded options contracts for voluntary carbon credits, enhancing market liquidity and providing new investment avenues.[24]

  These financial products enable companies and investors to manage risks associated with carbon pricing and capitalize on market opportunities, playing a crucial role in the transition to a low-carbon economy.

[23] How To Invest In Carbon Credits: A Comprehensive Guide for 2024-25 – KraneShares
[24] How voluntary carbon credit derivatives can drive sustainable investment in India, ET EnergyWorld

4.2

Framework for carbon price hedging

A strategic framework for hedging carbon price risk begins by first quantifying the exposure to carbon price volatility. Firms must assess both the regulatory and voluntary components of their carbon credit obligations. Typically, this involves identifying the expected carbon emissions over a specific period and calculating the total cost under varying price scenarios. This process forms the foundation of a risk management strategy that integrates carbon credits with traditional financial instruments like futures, options, etc.

Carbon markets are evolving, with instruments such as futures and options being structured with specific contract specifications that cater to diverse participants. For instance, European Energy Exchange (EEX) EUA Futures require minimum tick sizes of €0.01 per ton, enabling fine-grained price movements and better risk management for smaller firms. Similarly, Intercontinental Exchange (ICE) offers EUA Options with standardized exercise prices, streamlining strategic positions for hedging.

For example, consider a renewable energy firm that operates in both compliance and voluntary carbon markets. The company wants to hedge its exposure to volatile carbon credit prices while also seeking profit opportunities. Below is a step-by-step approach using various financial products.

Hedging strategy

Objective: Hedge against rising carbon credit prices, which could increase a firm's operational costs

- Use of Carbon Credit Futures (Hedging)
  - Action: Firm buys EU Allowance (EUA) futures on the European Energy Exchange (EEX)
  - Quantity: 10,000 EUAs at a locked price of €90/ton for delivery in 6 months
  - Outcome:
    - If EUA prices rise to €110/ton after 6 months, firm will take delivery of EUAs at the locked €90/ton
    - Impact: Firm avoids the impact of price increases on their operational costs
    - If prices fall to €80/ton, firm still pays the €90/ton, but the certainty of costs is more critical than potential savings
- Use of Carbon Credit Swaps (Hedging)
  - Action: Firm enters into a swap agreement with Bank X
  - Structure: Firm pays a fixed rate of €95/ton and receives a floating rate linked to the EUA spot price
  - Outcome:
    - If spot prices increase to €110/ton, firm benefits because it pays the fixed €95/ton while receiving payments for the €15/ton difference
    - If spot prices drop to €80/ton, firm pays more under the swap, but the swap ensures cost predictability for budgeting purposes

Trading strategy (profit-seeking)

Objective: Generate profit by taking speculative positions on expected movements in carbon credit prices

- Use of Carbon Credit Options (Speculation)
  - Action: Firm buys call options on EUA prices with a strike price of €100/ton, expiring in three months, on ICE (Intercontinental Exchange)
  - Premium paid: €5/ton for 5,000 EUAs
  - Possible outcome:
    - If EUA prices increase to €120/ton, firm exercises the option, buys EUAs at €100, and sells them at the market price of €120
    - Profit: (€20/ton x 5,000 EUAs) - (Premium €5/ton x 5,000) = €75,000
    - If prices remain below €100/ton, the option expires worthless, and firm loses only the premium (€25,000)
- Use of Voluntary Carbon Credit Derivatives (speculation)
  - Action: Firm buys voluntary carbon offset contracts through the AirCarbon Exchange (ACX) for 1,000 Verified Carbon Units (VCUs) at US$12/ton
  - Objective: Anticipate that demand for voluntary offsets will rise after COP28 climate conference announcements
  - Outcome:
    - If VCU prices rise to US$20/ton, firm sells its contracts at the new price
    - Profit: (US$20 - US$12) x 1,000 units = US$8,000

If prices fall, firm holds the credits for future market shifts or uses them for its sustainability reporting needs.

Portfolio diversification strategy (passive exposure)

Objective: Passive exposure to carbon credit price movements for diversification and long-term returns

- Use of Carbon Credit ETFs (diversification)
  - Action: Firm buys shares in the KraneShares Global Carbon Strategy ETF (KRBN) for US$30 per share
  - Number of shares: 1,000 shares at a cost of US$30,000
  - Possible outcome:
    - If the ETF rises to US$40/share after global carbon regulations tighten, firm sells its shares for US$40,000
    - Profit: US$40,000 - US$30,000 = US$10,000
    - If the ETF price falls, firm can hold the position as part of a long-term strategy

Summary of the example

Product	Strategy	Market Position	Risk Exposure	Potential Outcome
Futures	Hedging	Long (buy EUA futures)	Risk of price increase	Lock-in price of €90/ton
Swaps	Hedging	Fixed-for-floating	Fixed exposure to market changes	Payments if EUA spot price rises
Options	Trading (Speculative)	Call options on EUAs	Limited to premium paid	€75,000 profit if prices hit €120
VCU Derivatives	Trading (Speculative)	Buy VCUs on ACX	Exposure to voluntary market shifts	US$8,000 profit if VCU hits US$20
ETFs (KRBN)	Diversification	Buy ETF shares	Price fluctuations in the ETF	US$10,000 profit if ETF hits US$40

4.3

Firms engaged in carbon trading and hedging

Several companies are engaging in carbon markets primarily as a trading strategy to hedge against the fluctuating costs of carbon credits and to capitalize on potential financial gains. By actively trading carbon allowances and offsets, these firms are managing their financial risks associated with carbon pricing and seeking to generate profits, while also incidentally supporting the broader initiative to decrease carbon emissions worldwide. This approach underscores their focus on leveraging market mechanisms to achieve both fiscal prudence and strategic business advantages.

Tesla has generated a substantial revenue stream from trading carbon credits, earning US$1.79 billion in 2023 alone, which brings its total earnings from carbon credits to nearly US$9 billion since 2009. This profit comes from selling regulatory credits to other automakers who are unable to meet emission standards in regions like the US, Europe, and China.[25]

Table 1. Firms engaged in carbon trading and hedging

Company name	Revenue earned from carbon credits	Method of earning carbon credits
Tesla	US$1.79 billion in 2023	Sold regulatory carbon credits to other automakers unable to meet emission regulations[26]
Delhi Metro Rail Corporation	₹19.5 crore (approx. US$2.6 million) from 2012 to 2018	Earned by selling 3.55 million carbon credits accumulated over six years[27]
Goldman Sachs Group Inc.	Not publicly disclosed	Established carbon trading and finance desks to facilitate trading and investment in carbon markets[28]
JPMorgan Chase & Co.	Not publicly disclosed	Developed carbon trading capabilities, including hiring traders for voluntary carbon credits, to engage in carbon markets[29]
Credit Agricole	Plan to set up trading by 2025	Planning to exit precious metals market to focus on regulated carbon trading[30]

[25] Tesla Hits Record High Sales from Carbon Credits at $1.79B
[26] Tesla Hits Record High Sales from Carbon Credits at $1.79B
[27] Delhi Metro Rail Corporation earns Rs 19.5 crore from sale of 3.55 million carbon credits - Infrastructure News | The Financial Express
[28] Wall Street gets ready to cash in on $1 trillion climate market
[29] Carbon Market Principles
[30] Exclusive: Credit Agricole CIB chooses carbon trading over gold, sources say | Reuters

05

Cash flow implications of carbon trading

The impact of carbon trading on a firm's cash flow can be substantial, especially for companies operating in industries with high emissions. Compliance with regulatory schemes such as the EU ETS or participation in voluntary markets can result in significant cash outflows if carbon prices rise unexpectedly. Firms need to manage these cash flow implications carefully to avoid disruptions to their broader financial operations.

Additionally, while carbon trading represents a cost, it also offers potential financial returns.

Companies that invest in renewable energy, energy efficiency, or carbon capture projects can not only reduce their own emissions but also generate revenue by selling surplus credits. Furthermore, businesses that proactively engage in carbon trading often see a reputational boost and increased stakeholder trust, which can lead to financial rewards in terms of market share and customer loyalty.

5.1

Impact of price volatility

Price volatility in carbon markets pose a direct challenge to firms' cash flow management. For example, the price of carbon allowances in the EU ETS increased from approximately €25 per ton in early 2020 to over €85 to €100 per ton by 2023, causing significant cost increases for companies that are net buyers of carbon credits. This volatility can lead to budgetary uncertainty and require companies to allocate additional resources to purchase credits, reducing the funds available for other operational needs.

Consider a firm which produces 100,000 tons of CO2, emissions annually. Under the EU ETS, this firm is mandated to purchase carbon allowances to cover its emissions. At a carbon price of €25 per ton, the total cost for carbon allowances amount to €2,500,000. Conversely, at a price of €90 per ton, the total cost escalates to €9,000,000. This price fluctuation results in an increased cash outflow of €6,500,000, necessitating a re-evaluation of budget allocations and possibly leading to the deferral of critical operational investments.

Locking in prices through futures contracts, as mentioned, provides some predictability and helps firms smooth out these cash flow impacts. However, companies must balance the cost of hedging with the potential savings, as locking in prices through futures contracts may also limit potential cost reductions in cases where carbon prices fall.

5.2

Managing operational and compliance cost

Companies operating in regulated carbon markets, such as the EU ETS, must purchase sufficient carbon credits to cover their emissions. These compliance costs can be substantial, particularly for firms with high carbon footprints. Beyond the cost of purchasing credits, there are operational expenses associated with monitoring emissions, verifying compliance, and managing credit portfolios.

To mitigate these expenses, firms should invest in digital tools like SAP Carbon Impact, Honeywell Forge, etc, that automate emissions tracking and compliance reporting, thereby reducing administrative overhead and improving accuracy. These tools not only lower operational costs but also allow for better planning around credit purchases by providing real time insights into emissions levels. Firms should also prioritize investments in emissions reduction technologies. This approach not only reduces the number of credits needed but also offers potential to generate revenue by selling surplus credits if emissions fall below mandated thresholds.

When deciding between internal emissions reduction initiatives and purchasing external credits, firms must rigorously analyse long term costs. Additionally, firms should also account for indirect costs such as legal fees for emissions verification, the administrative burden of regulatory audits and penalties for potential misreporting.

By integrating these advanced software solutions, businesses can monitor, manage and optimize their carbon credit portfolios. These tools provide real-time insights into emissions data, credit holdings and market trends, enabling companies to make informed decisions that stabilize long term cash flows.

Table 2. Software's suitable for major industries

Major industries	Software	Features
Energy and utilities	IBM Envizi, Schneider Electric's EcoStruxure Resource Advisor, Honeywell Forge	Helps in monitoring energy consumption calculating Scope 1, 2 and 3 emissions
Manufacturing	S-Carbon by SGS, Enablon by Wolters Kluwer	S-carbon offers a robust carbon management platform focusing on standardized quantification of GHG data across the entire value chain, while Enablon provides monitoring, reporting and audit trails aligned with global standards
Transportation and logistics	GHGP Transport Calculator, AirTracker, EcoAct	AirTracker specializes in calculating transportation related emissions, and EcoAct's tools offer detailed reporting on freight and supply chain carbon footprints
Construction and real estate	Measurabl and Autodesk Insight	Measurabl is widely used to monitor emissions in commercial real estate, focusing on scope 1 and scope 2 GHGs, while Autodesk insights aids in creating energy efficient building designs with reduced emissions
Chemicals and petrochemicals	Sphera's Sustainability Management, Enviance	Sphera's suite includes advanced modules for emissions calculation specific to volatile organic compounds (VOCs), making it suitable for industries handling hazardous materials

Major industries	Software	Features
Food and agriculture	Cool Farm Tool, Agri-Footprint	Cool Farm Tool is designed to measure and mitigate emissions related to agricultural practices
Mining and metals	Isometrix, Enablon	Isometrix provides tools for emissions tracking in high-impact operations like mining and smelting, offering compliance with environmental standards
Financial services	SAP Carbon Place, Persefoni, Watershed	These platforms offer granular GHG accounting for investments and portfolios, helping institutions align with ESG and sustainability standards

**Major industries and Softwares*

06

Making the call: Investing in carbon credits

We have developed a decision-making framework to help companies assess whether they should engage in carbon credit trading. The framework considers both financial and operational factors affecting decision making

6.1

Regulatory requirements

For firms operating in jurisdictions with mandatory cap-and-trade systems, trading carbon credits is often non-negotiable. Compliance with regulatory requirements, such as the EU ETS, necessitates the purchase of carbon credits to offset emissions beyond allowed thresholds.

Firms need to assess whether they fall under such regulations and, if so, develop a compliance strategy that balances cost control with long-term sustainability goals. We advise companies to treat carbon trading as a strategic initiative, rather than merely a compliance obligation, by integrating it into broader corporate risk management frameworks.

6.2

Risk tolerance and price volatility

Companies must evaluate their tolerance for price volatility in carbon markets. Firms with lower risk tolerance may prefer to stay out of highly volatile markets unless they can effectively hedge against price risks through futures contracts or other financial instruments. A growing number of industries such as energy, manufacturing, transportation and agriculture, have begun actively investing in carbon credits as part of their broader sustainability strategies. These sectors are heavily exposed to carbon pricing fluctuations due to their high emissions profile.

Companies must conduct a comprehensive risk assessment that includes scenario analysis of various carbon price trajectories. This assessment should account for regulatory changes, market trends, and technological advancements that may influence the supply and demand of carbon credits. Firms with low risk tolerance like transportation or power generation companies should consider hedging their exposure through futures contracts or green bonds to manage volatility and ensure predictable cost outcome. While those with higher risk tolerance such as Oil and Gas firms or Mining industry may choose to take on more market exposure in exchange for potential cost savings.

6.3

Liquidity and market access

Firms must evaluate whether they have access to liquid carbon markets that allow them to trade credits at competitive prices. Markets with low liquidity can lead to higher transaction costs and greater difficulty in executing trades.

Companies should prioritize participation in well-established markets, such as the EU ETS or the CME Group's GEO futures market, where liquidity is higher, and price transparency is greater. Firms considering participation in less liquid markets should carefully assess the associated risks and consider whether the potential benefits outweigh the operational challenges.

6.4

Alignment with corporate sustainability goals

Carbon trading should align with a firm's overall sustainability and ESG objectives. Companies with strong sustainability commitments may find that trading carbon credits enhances their ability to meet these goals, particularly if they focus on purchasing high-quality credits from verified projects.

6.5

Financial impact and ROI

The final decision to engage in carbon trading should be based on a financial analysis of the expected return on investment (RoI). Firms need to weigh the costs of purchasing credits against the potential savings from avoiding regulatory penalties or enhancing corporate reputation and meeting their sustainability commitments. This decision-making process becomes even more critical as companies are increasingly under scrutiny to demonstrate tangible climate action and accountability.

Firms should perform a detailed financial analysis that accounts for both the direct costs of purchasing credits and the indirect benefits of participating in carbon markets. These benefits may include improved investor relations, enhanced brand reputation, and reduced regulatory risk. For instance, Chevron purchased around 5.8 million carbon offset credits from projects in Colombia between 2020 and 2022 to support its compliance strategy and net-zero goals. This investment reflects Chevron's intent to offset emissions from its operations, demonstrating how companies can use carbon credits as a tool for regulatory alignment. However, Chevron's efforts have also faced challenges around the credibility of these offsets, underscoring the importance of selecting high- quality credits that meet recognized standards.

Similarly, Microsoft has been a leading player in the voluntary carbon market, acquiring offsets from various global projects, including reforestation initiatives in the U.S., as part of its ambitious carbon-negative goal by 2030[31][,32]. Microsoft's carbon offset program includes a mix of high-quality carbon credits that undergo verification to ensure authenticity and impact. However, the tech giant also encounters the industry-wide challenge of variability in offset quality, which can affect the overall environmental outcomes. This example highlights how firms with significant carbon footprints use carbon markets strategically to support their sustainability narratives, while navigating the complexities of ensuring the reliability of their offset investments.

[31] Microsoft to buy 8 million carbon credits from BTG Pactual in largest-ever sale | Reuters
[32] Microsoft and Occidental sign carbon credit deal to help offset AI energy surge

By incorporating both financial and non-financial factors into their analysis, firms can make more informed decisions about their participation in carbon markets. The Chevron and Microsoft examples showcase how carbon trading can serve as a valuable component of a comprehensive sustainability strategy, if firms adopt a discerning approach to offset selection.

Example [33]:

Consider a manufacturing company that produces 100,000 metric tons of CO_2 emissions annually. Faced with regulatory targets to reduce emissions by 15% over the next three years, the company explores carbon credit trading as a strategic approach to meet these targets cost-effectively.

The estimated cost to achieve internal reductions (e.g., installing new energy-efficient systems) is US$2 million. Alternatively, the firm could achieve the same reduction by purchasing high-quality carbon credits at US$60 per ton. This would amount to US$900,000 for the three-year period—significantly lower than the internal investment required.

Business case analysis:

- Direct cost comparison
  - Internal reduction cost: US$2 million
  - Carbon credit purchase cost: US$900,000

By opting to purchase credits, the company saves US$1.1 million in direct costs.

- **Accretive financial value**

In addition to direct savings, the firm anticipates a positive impact on brand perception. This can translate into stronger investor confidence, as sustainability metrics are increasingly influencing shareholder value. The firm estimates that enhanced reputation could attract new investors, potentially increasing market capitalization by 1%.

- **Regulatory and risk mitigation**

By proactively purchasing verified carbon credits, the firm avoids potential non-compliance penalties that could reach US$500,000 annually if emission targets are unmet. Carbon credit trading not only ensures compliance but also shields the company from regulatory fluctuations.

- **Calculated ROI**
  - Total financial savings (Direct Cost + Avoided Penalties): US$1.60 million
  - Investment in carbon credits: US$900,000
  - RoI: 77%

[33] All figures are hypothetical

07

The road ahead

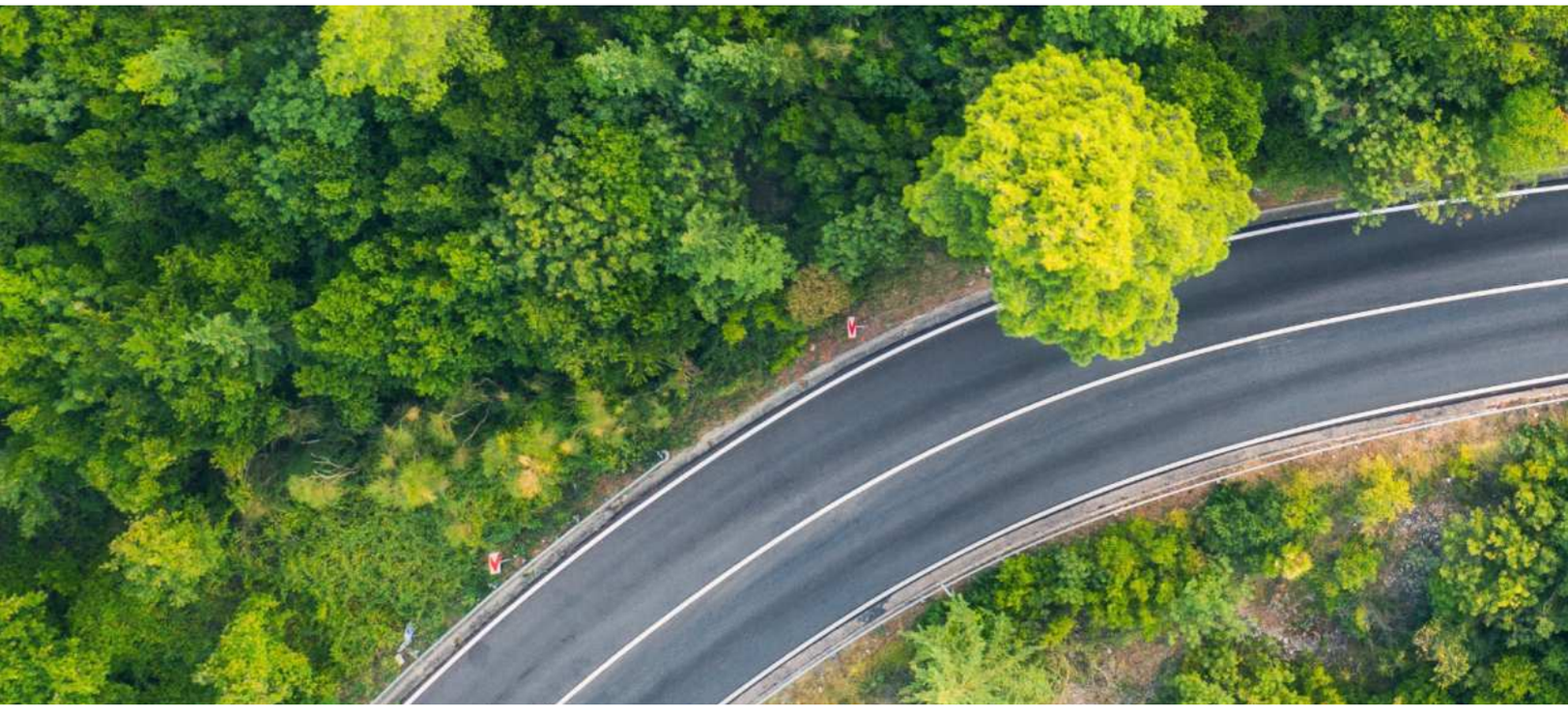
As we stand at the crossroads of climate action and economic transformation, the future of carbon markets beckons with both promise and complexity. The path forward is one of strategic navigation, where foresight will be as crucial as the agility to adapt to an ever-shifting landscape. In the quest to balance environmental imperatives with market realities, the evolution of carbon markets will be marked by innovation, regulatory refinement, and the integration of advanced technologies.

7.1

Global integration of carbon markets

As we look to the maturation of carbon markets, the concept of connecting emissions trading systems (ETS) across different regions emerges as a powerful catalyst for market growth. The potential to weave together platforms like the EU ETS with China's National ETS presents an opportunity to forge the world's most expansive carbon market. Such integration promises to inject much-needed liquidity and stabilize prices, which in turn could lower the costs associated with reducing emissions and offer countries increased flexibility in achieving their climate commitments.

Article 6 of the Paris Agreement lays the groundwork for international carbon credit trading, signalling a move towards a more cohesive global market. The pioneering linkage of the EU ETS with Switzerland's ETS in 2020[34] exemplifies the tangible benefits of market integration. This successful partnership allows for the seamless exchange of credits and sets a precedent for future collaborations between larger markets. As we continue to navigate the complexities of global climate policy, the expansion of ETS linkages stands as a testament to the power of cooperative action in the pursuit of a sustainable future.



[34] Linking the Swiss and EU emissions trading systems (admin.ch)

7.2

Increased private sector participation

The surge in corporate commitments to net-zero targets, coupled with the intensifying focus on Environmental, Social, and Governance (ESG) criteria, is fuelling a significant uptick in engagement with carbon markets. For instance, companies like Microsoft and Amazon have made substantial investments in carbon credits as part of their sustainability initiatives, aiming to offset their emissions through high-quality credits from verified projects. In 2022, Microsoft committed to removing more carbon than it emits by 2030,[35] focusing on projects that meet rigorous standards, such as those verified by Verra and Gold Standard. Amazon has also pledged to reach net-zero carbon by 2040 and has invested in nature-based carbon removal projects, which includes partnerships with the Nature Conservancy to protect and restore forests[36]. As businesses accelerate their sustainability initiatives, the appetite for premium carbon credits is set to swell, heralding a new era of demand-driven growth in this sector.

Similarly, Shell and BP have integrated carbon credits into their energy transition plans, purchasing credits to offset emissions from their high-carbon operations. BP's "Target Neutral" program offsets emissions from its customers' fuel use through carbon credits sourced from renewable energy and conservation projects, helping the company align its operations with its sustainability goals. Moreover, the demand for carbon credits is set to grow as corporations, especially in high-emission sectors like aviation and energy, face increased regulatory scrutiny and stakeholder expectations.

This burgeoning demand is poised to catalyse advancements in project verification processes and enhance the overall transparency of carbon markets. Such progress is anticipated to bolster the integrity and resilience of the systems underpinning carbon credit trading. As companies strive to align their operations with their ESG objectives, the carbon market is expected to evolve into an increasingly sophisticated and trusted mechanism for offsetting emissions, playing a pivotal role in the global transition to a low-carbon economy.

[35] On the road to 2030: Our 2022 Environmental Sustainability Report - Microsoft On the Issues
[36] The Nature Conservancy and Amazon Partner to Bring Natural Climate Solutions to Scale - PEDRR

7.3

Technological advancements and digital carbon markets

The trajectory of carbon trading is set to be reshaped by the strategic adoption of cutting-edge technologies such as artificial intelligence (AI) and blockchain. These innovations hold the key to addressing some of the most pressing challenges in carbon markets, including the need for greater transparency, the reduction of fraudulent activities, and the streamlining of the verification process.

Blockchain technology offers a robust solution for maintaining unalterable records of carbon credit transactions. By leveraging its decentralized ledger, blockchain can ensure that each credit is unique and accounted for, effectively eliminating the risk of double counting and enhancing the authenticity of carbon credits. Meanwhile, AI has the potential to revolutionize emissions monitoring by providing real-time data analysis, which can lead to more accurate and timely insights into carbon footprints.

The integration of these technologies can significantly reduce the administrative burden associated with carbon trading, lowering costs and simplifying processes. This, in turn, can foster a higher degree of confidence and trust in the carbon markets, making them more attractive to a broader range of participants. As these technological advancements gain traction, we can expect to see a more efficient, reliable, and scalable carbon trading ecosystem emerge—one that not only supports corporate sustainability goals but also contributes to the global effort to combat climate change.

7.4

Economic opportunities

The carbon market is poised for exponential growth as its dual role as a compliance tool and financial asset continues to evolve. Companies are increasingly viewing carbon credits not only as a means to offset emissions but also as an integral part of their financial strategies.

Beyond compliance, financial institutions and corporations are leveraging carbon markets for profit-making opportunities. For example, companies with surplus credits, such as those in renewable energy sectors, can generate additional revenue by selling these credits to firms with higher emissions. This has transformed carbon credits into tradable assets with significant revenue potential, as evidenced by public disclosures from organizations like Tesla, which earned US$1.79 billion in 2023 through the sale of regulatory credits.

Furthermore, the rise of financial instruments such as carbon-focused ETFs and voluntary market derivatives is enabling investors to gain exposure to this emerging asset class. For instance, exchange platforms like the European Energy Exchange (EEX) report increasing trading volumes in futures and options tied to carbon markets, reflecting growing institutional interest. These trends underline the financialization of carbon credits, positioning them as a vital tool for both environmental action and economic returns.

As the market matures, opportunities for arbitrage, speculative trading, and structured financial products will continue to grow, driving innovation and expanding the economic value of carbon markets. This alignment of environmental goals with financial strategies highlights the potential of carbon trading to catalyze global efforts toward a low-carbon economy.

08

Conclusion

Navigating the carbon market landscape presents a nuanced blend of hurdles and opportunities for businesses. At EY, we maintain that a holistic and strategic approach is paramount for companies engaging in carbon trading. This approach should adeptly balance the intricacies of risk management while actively pursuing investments in carbon reduction initiatives. By harnessing the power of emerging technologies, businesses can enhance the transparency and efficiency of their carbon trading activities, thereby mitigating risks associated with market volatility and regulatory compliance.

Carbon markets are no longer confined to compliance—they are emerging as financial ecosystems offering opportunities for strategic growth. Companies with surplus credits can leverage these assets to generate additional revenue by participating in dynamic trading within compliance or voluntary markets. For example, trading credits during periods of high demand can significantly boost profitability, provided organizations have the tools and insights to act swiftly and strategically.

The ability to navigate price volatility is equally critical. Firms that integrate predictive analytics and advanced carbon management tools into their operations can optimize the timing of credit purchases and sales, ensuring that their financial resources are deployed efficiently. By aligning trading strategies with market trends, businesses can stabilize their financial performance while meeting their sustainability commitments.

Staying abreast of regulatory shifts is not merely a matter of compliance but a strategic imperative that can inform smarter carbon trading decisions. Regulatory foresight enables companies to anticipate changes that could impact carbon markets and adapt their strategies accordingly. This proactive stance ensures that businesses are not caught off guard by new policies and can position themselves advantageously within the market.

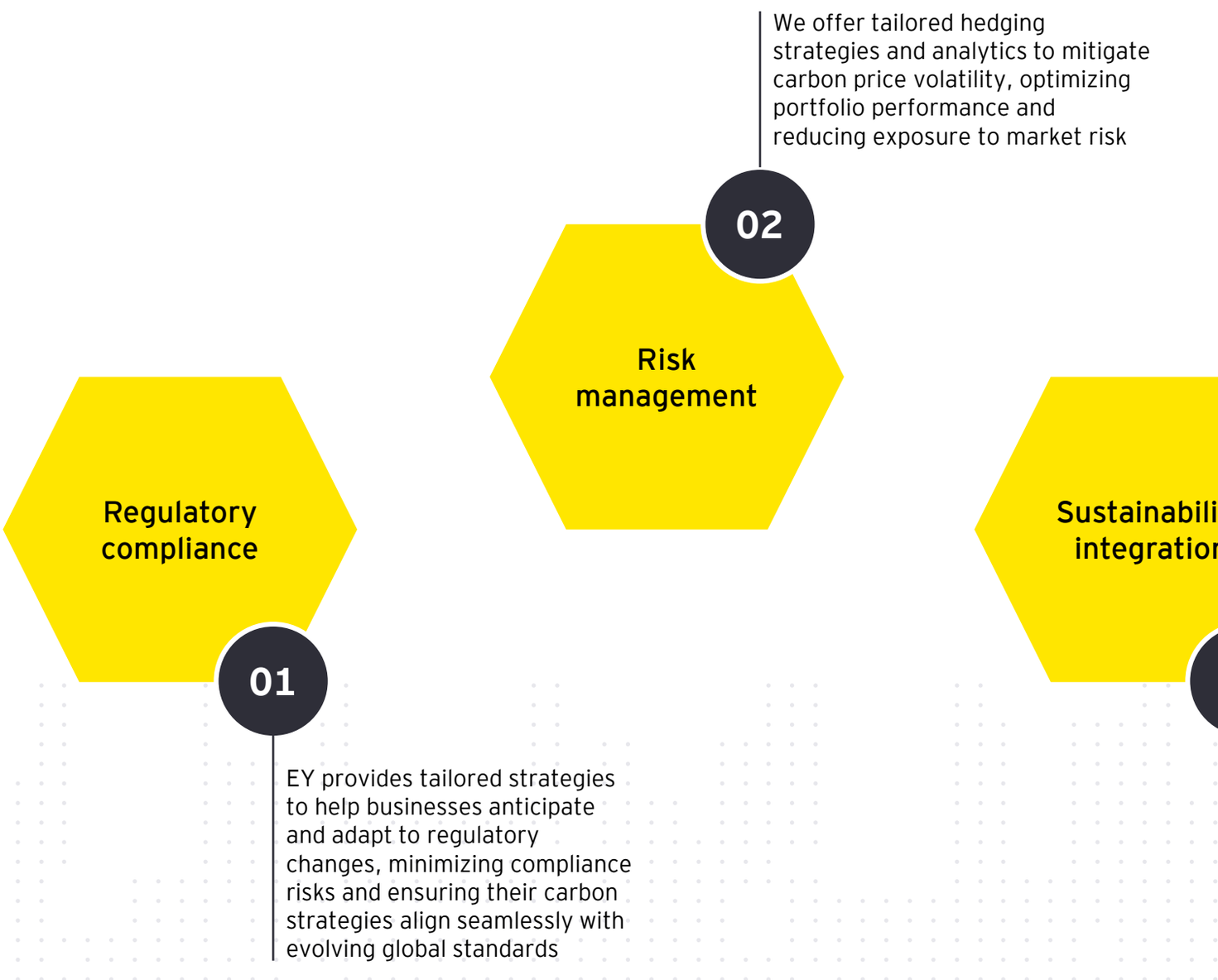
Moreover, integrating carbon trading into the broader spectrum of corporate sustainability objectives allows for a more cohesive and impactful approach to climate action. Carbon trading should not be seen in isolation but as a component of a company's comprehensive sustainability strategy. This alignment ensures that carbon trading efforts reinforce broader environmental commitments, enhance the company's reputation, and satisfy stakeholder demands for responsible corporate behaviour.

In conclusion, businesses that successfully leverage technology, remain vigilant to regulatory developments, and embed carbon trading within their sustainability framework are poised to unlock enduring value. By embracing the dual role of carbon markets as compliance mechanisms and financial opportunities, organizations can align themselves with the global momentum toward a low-carbon economy while driving profitability and long-term growth.

09

Our commodity advisory approach and how can EY help

At EY, we provide strategic support to help organizations seamlessly integrate carbon trading and risk management practices into their operational and financial frameworks. By aligning with industry standards and leveraging advanced methodologies, we focus on precise measures as compliance cost impact, carbon price hedging effectiveness and emissions reductions ROI. Our approach includes developing robust carbon risk profiling, effective hedging programs and efficient compliance tracking, enabling companies to mitigate carbon market volatility and meet regulatory requirements. With EY's tailored solutions, businesses can confidently navigate the complexities of carbon markets, optimize trading strategies and advance towards sustainable growth.



Our digital tools enhance emissions data accuracy and transparency, ensuring compliance and building stakeholder trust through advanced reporting and analytics

04

Technology and transparency

ty
n

03

EY helps embed carbon trading with broader sustainability goals, enhancing ESG performance and driving progress towards net-zero targets

Market entry strategy

05

We provide customized guidance for businesses entering carbon markets, from strategy development to execution, ensuring smooth and confident market participation

Our risk management approach at glance

Carbon emissions assessment

Benchmark carbon trading and compliance strategies

Benchmarking

Identify improvement opportunities

Defining method

- Carbon risk mitiga
- Impact analysis an

	Current emissions assessment		Benchmarking
Aspects	**Risk identification**	**Risk strategy**	**Benchmarking**
Approach	▪ Carbon risk mitigation and cost management ▪ Impact analysis and setting risk appetite	▪ Management of identified risks ▪ Defining risk assessment Model for different types of risks ▪ Carbon price risk hedging and compliance strategies	▪ Benchmark against industry standards for carbon trading strategies and regulatory compliance ▪ Evaluate performance against carbon neutrality or reduction benchmarks
Key measures	▪ Carbon price risk exposure ▪ Compliance risk ▪ Regulatory risk exposure ▪ Cash flow impact	▪ Increase emissions offsets ▪ Structured credit allocation ▪ Hedging approach ▪ Carbon trading compliance	▪ Identification of gaps in carbon trading strategies ▪ Integrate carbon strategy into compliance policies ▪ Align with industry Standards

ogy

tion and cost management

d setting risk appetite

Enable

- Hedging program
- Implementation support for carbon initiatives

Monitor

- Automation and analytics
- Monitor emissions, trading and compliance

Defining methodology

Compliance & monitor

Carbon exposure quantification

Hedging program

Review and reporting

- Quantify exposure to carbon price volatility, ETS or VCM compliance costs and risks from regulatory shifts
- Mapping risk to financial to understand the impact
- Defining risk appetite/ threshold

- Assessing risk reduction versus cost of hedging
- Sensitivity analysis on pre & post hedging
- Defining products for hedging
- Defining hedging horizon

- Establish robust reporting structures for carbon trading compliance metrics and trading performance
- Develop KRIs, KPIs and dashboards
- Define processes and governance
- Implement automated real time tracking of emissions, trading, etc

- Financial impact on P&L from price volatility
- Set risk tolerance threshold

- Cost of hedging
- Scenario-based Sensitivity to price volatility

- Emissions impact assessment
- Financial impact of compliance
- Hedging effectiveness

10

Normative model for carbon trading

Below is an EY Normative model outlining the necessary functions required to support front, middle and back-office activities for carbon trading. Establishing a well-defined process will ensure smooth workflow, clear segregation of duties and enhance the effectiveness of the trade life cycle.

Carbon

Mega process

Major process

Front office	Middle office	
Deal execution	**Transaction support**	**Portfolio support**
▪ **Front office analytics** Fundamental analysis Modelling ▪ **Trading** ▪ Deal capture and modification ▪ Hedge strategy ▪ Asset optimization ▪ **Curve development**	▪ **KYC & Counterparty setup** ▪ **Contract Administration** ▪ Certification allocation and management ▪ Compliance monitoring ▪ **Credit exposure monitoring** ▪ **Deal validation & confirmation** ▪ **Collateral / margining management**	▪ **Portfolio structure** ▪ Integration of approved trading instruments ▪ Book structure creation and maintenance ▪ **Curve validation** ▪ **MTM & P&L valuation**

Support functions: Information technol

trading

Back office

Risk reporting	Settlements	Financial accounting

▪ **P&L and position**
  ▪ P&L attribution
  ▪ Portfolio position report
▪ **Limit reporting**
  ▪ Trader & broker limits
  ▪ Position limits
  ▪ Violation/breach reporting
▪ **Regulatory reporting**
▪ **Operational risk reporting**
▪ **Market risk reporting**
  ▪ Value-at-Risk (VaR)
  ▪ Sensitivity analysis
  ▪ Stress testing
	▪ **Volume actualization**
	▪ **Counterparty settlements**
	▪ **Broker/ exchange settlements**
	  ▪ Calculation of margin requirements
	  ▪ Reconcile settlement statement
		▪ **Month-end close**
		  ▪ Journal entry preparation and review
		  ▪ Balance sheet reconciliation
		  ▪ Accounting disclosure
		  ▪ Derivative accounting
		  ▪ Closing calendar and checklist
		▪ **Management reporting**
		  ▪ Profit and loss
		  ▪ Liquidity analysis
		  ▪ Actual vs. budget

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