Unlocking Corporate Benefits in Emission Trading Systems (ETSs)

Opportunities for Businesses in the Indian Carbon Market

February 2025

Environmental Defense Fund

Our Work in India

A global nonprofit, Environmental Defense Fund (www.edf.org) collaborates with governments, NGOs, research and academic institutions, corporates and others to support and advance India's vision of shared, sustainable prosperity. We combine scientific and economic foundations, a broad network of partnerships and a pragmatic approach in support of India's ambitions. Our areas of interest include demonstrating the viability of sustainable livelihoods in agriculture, livestock and fisheries, establishing the shareholder value potential through responsible business, informing of the potential of market-based mechanisms, and catalyzing the climate technology ecosystem in India.

With extensive expertise in both compliance and voluntary carbon markets, EDF works across geographies to ensure high-integrity emissions trading systems that deliver measurable environmental and societal benefits. In India, EDF aims to leverage its global experience to support a robust Indian Carbon Market (ICM) that aligns with the country's economic priorities, energy security, and climate goals, enabling businesses to thrive in a low-carbon economy.

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ABBREVIATIONS

CBAM	Carbon Border Adjustment Mechanism
CCC	Carbon Credit Certificates
CCR	Cost Containment Reserve
CCTS	Carbon Credit Trading Scheme
ECR	Emission Containment Reserve
ETS	Emissions Trading System
EU ETS	European Union Emissions Trading System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ICM	Indian Carbon Market
MSR	Market Stability Reserve
MRV	Monitoring, Reporting & Verification
NDC	Nationally Determined Contribution
PAT	Perform, Achieve and Trade
RGGI	Regional Greenhouse Gas Initiative
WCI	Western Climate Initiative

EXECUTIVE SUMMARY

INTRODUCTION

A well-designed Emissions Trading System (ETS) offers businesses a unique opportunity to enhance operational efficiency, drive technological innovation, and strengthen market competitiveness while aligning with a country's sustainability goals. An ETS is a market-based policy which aims to reduce emissions by placing a cap on the amount of greenhouse gas (GHG) emissions that can be emitted by industries and allows them to trade allowances, thereby incentivising adoption of cleaner technologies and cost-effective abatement.

India's Transition from PAT to CCTS: A Strategic Shift:
India is progressively transitioning from the Perform, Achieve, and Trade (PAT) scheme – which focused on energy efficiency – to the Carbon Credit Trading Scheme (CCTS), which broadens the scope to GHG emissions reductions. The CCTS consists of: a) A Compliance Mechanism, mandating emissions intensity targets for 9 high-emission industry sectors; b) An Offset Mechanism, allowing voluntary emissions reduction projects in sectors like agriculture, transport, and forestry to generate carbon credits. As India's CCTS evolves, businesses have an unprecedented opportunity to integrate carbon markets into their corporate strategy.

THE OPPORTUNITIES OF ETSs IN UNLOCKING BUSINESS VALUE

Significant Emissions Reductions

- ETSs have successfully driven emissions reductions across multiple sectors.
- Studies of 21 carbon pricing schemes indicate reductions between 4% and 15%, even with low carbon prices.
- Emissions from EU ETS covered sectors have reduced nearly by 50% since 2005, while China's pilot ETSs have reduced emissions by an average of 13% and improved energy efficiency.

Positive or Neutral Economic Performance

- Empirical evidence suggests that ETSs do not negatively impact economic performance and may even improve firm competitiveness.
- The EU ETS has increased revenues by ~16% and fixed assets by ~8% for regulated firms without affecting employment or profitability.
- In China, pilot ETSs lowered operating costs and improved profitability, particularly for state-owned enterprises.

Innovation and Technological Advancement

- ETSs encourage investment in energy efficiency, research & development (R&D), and low-carbon technologies.
- The EU ETS has increased low-carbon patenting by ~10% in regulated firms, with over 60% of firms investing in emissions reduction measures.
- In China, regions with ETSs saw higher rates of innovation, particularly in areas with higher carbon prices and active allowance trading.

KEY ETS DESIGN ELEMENTS THAT INFLUENCE CORPORATE PERFORMANCE

The design of an ETS significantly impacts corporate performance, influencing business decisions related to emissions reductions, investment in low-carbon technologies, and overall competitiveness. Key ETS design elements include emissions caps and targets, allowance allocation, price management mechanisms, carbon credit permits and policy and regulatory certainty, each of which determines the cost-effectiveness, flexibility, and stability of the carbon market.

India's CCTS adopts an intensity-based baseline-and-credit system where there will be both a sectoral trajectory and a target for individual entities based on emissions per unit of output. Instead of free allocation and auctioning, CCTS operates on a performance-based mechanism where businesses receive Carbon Credit Certificates (CCCs) only if they outperform emissions intensity targets. It also incorporates a floor price, forbearance price and a future market stability reserve (MSR).

Key Business Impacts

- Flexibility and growth: Intensity-based caps in CCTS allow businesses to scale production while reducing emissions per unit output.
- Cost-effective decarbonization: Performance-based crediting encourages investment in energy efficiency and clean technologies.
- Market stability and adaptability: CCTS minimizes risks from economic fluctuations but may experience short-term price volatility.
- Simplified Compliance: No auctioning reduces administrative burdens, making participation easier for businesses.
- Potential market risks: Unregulated CCC supply could lead to oversupply (depressing prices) or shortages (driving up compliance costs).

INTRODUCTION

Well-designed emissions trading systems (ETSs) have the potential to unlock significant opportunities for businesses by fostering efficiency, innovation, and competitiveness. An efficient environmental policy is described as one that:

- Identifies resource inefficiencies and opportunities for technological improvements in companies
- Raises corporate awareness by improving information gathering
- Minimizes uncertainty to encourage investment
- Maximizes opportunities for innovation and progress
- Levels the playing field for companies while transitioning
- Offset the cost of compliance for environment until innovation is adopted[1].

Evidence from existing carbon markets underscores all these potential benefits. The implementation of ETSs around the world has spurred investment in energy efficiency, R&D, and low-carbon measures that reduce emissions. Beyond technological innovation, carbon pricing can encourage businesses to rethink operational and financial strategies, leading to organizational shifts and aligning corporate objectives with long-term sustainability goals[2,3].

The potential benefits of ETS policies may be even more pronounced in developing economies. By addressing energy inefficiencies and reducing pollutants that impair health and productivity, carbon pricing can unlock significant economic and environmental gains. However, realizing these benefits requires stable and transparent policy mechanisms that provide confidence to both industry and the financial community and incentivize strategic, low-carbon investment to align with future market environments[2,4].

SCOPE AND INTENDED IMPACT

This report explores how ETS policies, when designed well and implemented effectively, can create transformative opportunities for businesses. The report has the following in focus:

Purpose

- To demonstrate that compliance with carbon market provisions is not just a regulatory necessity but a strategic lever for enhancing operational efficiency, driving innovation, and strengthening market competitiveness.

- To provide insights to corporate leaders on how businesses can re-position by proactively aligning in a low-carbon economy and identifying new market opportunities.

Audience

- CXOs and Senior Executives: Decision-makers who shape corporate strategy and sustainability goals.
- Corporate Representatives involved in regulatory compliance, sustainability, and operational efficiency.
- Industry Leaders and Policymakers looking to understand how ETS policies can drive corporate competitiveness and economic transformation.

This report aims to empower businesses with actionable insights, helping them navigate and leverage carbon markets for long-term success.

Box 1: About Emissions Trading Systems (ETSs)

What is carbon pricing?

As the name suggests, a carbon price is a price on greenhouse gas (GHG) emissions, particularly carbon dioxide (CO2). Carbon pricing captures the external costs of GHG emissions—the costs of emissions that the public pays for, such as damage to crops, health care costs from heat waves and droughts, and loss of property from flooding and sea level rise—and ties them to their sources through a price[5].

There are two main types of carbon pricing: emissions trading systems (ETS) and carbon taxes.

1. An ETS – often called "cap-and-trade" – places a limit on the total level of greenhouse gas emissions and creates a market for trading GHG emissions. In other words, the amount of emissions is fixed, but the carbon price level fluctuates with the market.
2. A carbon tax directly sets a price on carbon through a fixed tax rate on greenhouse gas emissions or the carbon content of fossil fuels. Unlike an ETS, the carbon price is fixed, but the amount of emissions is not.

ETSs Across the Globe

There are currently 36 ETSs in operation worldwide, covering 18% of global GHG emissions. An additional 22 ETSs are in various stages of consideration and development. Jurisdictions with ETSs account for 58% of global GDP and approximately one-third of the global population lives under an ETS[6].

Emerging Economies Leading the Way

Emerging economies are increasingly leading the momentum in developing and implementing new ETSs.

Latin America:

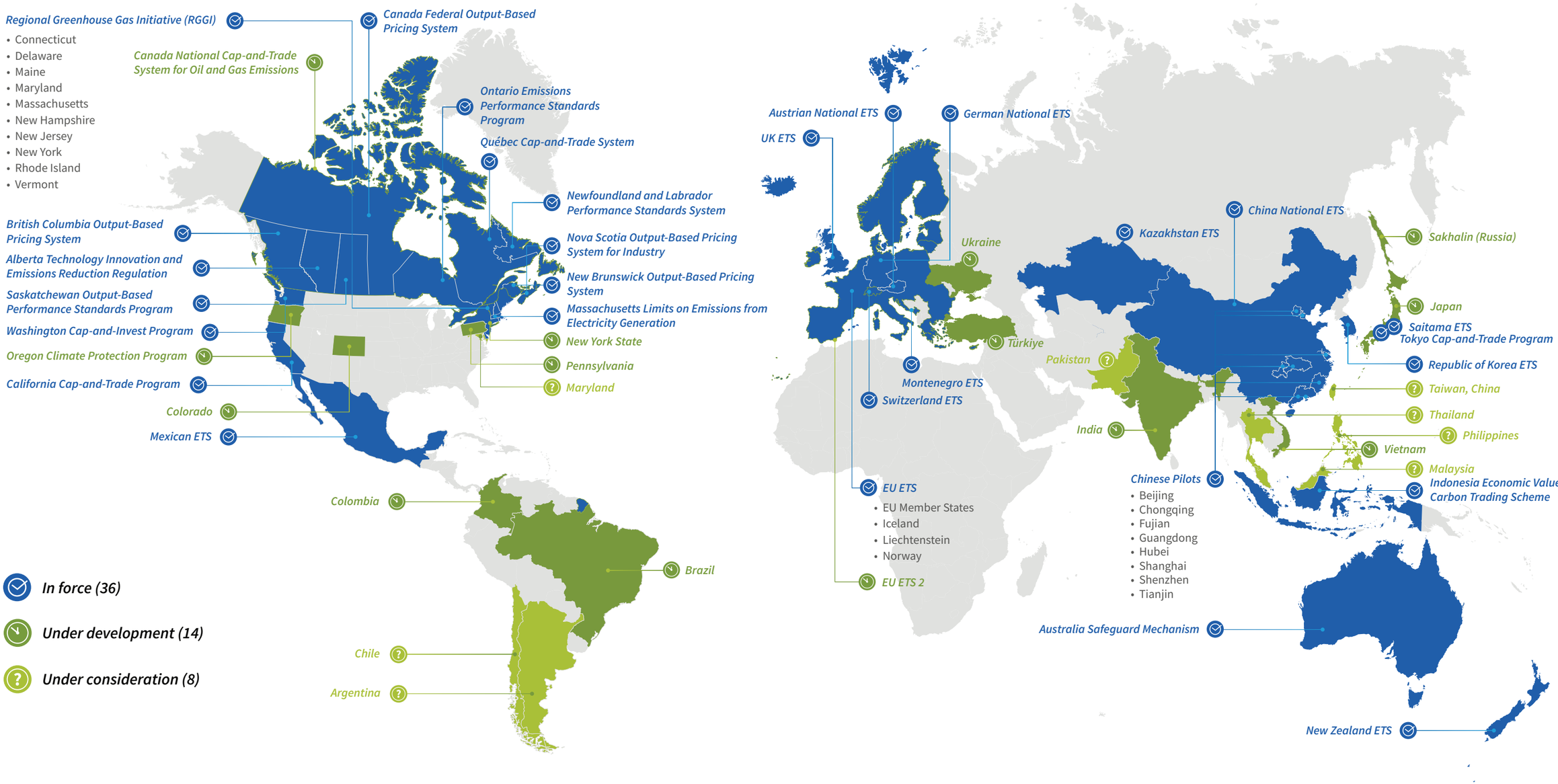
- Brazil adopted a law to establish Brazilian Greenhouse Gas Emissions Trading System in December 2024[7].
- Argentina has proposed a Carbon Bill that includes an ETS and is considering a carbon market for the energy sector.
- Mexico is operating a pilot ETS, which will be transitioned to full implementation.
- Chile and Colombia have gained experience with carbon taxes and are preparing for ETS implementation.

Asia-Pacific:

- India is planning to launch its Carbon Credit Trading Scheme (CCTS) in 2025.
- Indonesia launched its ETS for the power generation sector in 2023.
- Vietnam is planning to start a pilot ETS soon.
- Other countries like, Malaysia, Pakistan, the Philippines and Thailand are also exploring or developing ETSs.

Türkiye is planning to launch a pilot phase of its Turkish Emission Trading System in 2025[8].

FIGURE 1: MAP OF EMISSIONS TRADING SYSTEMS[6]



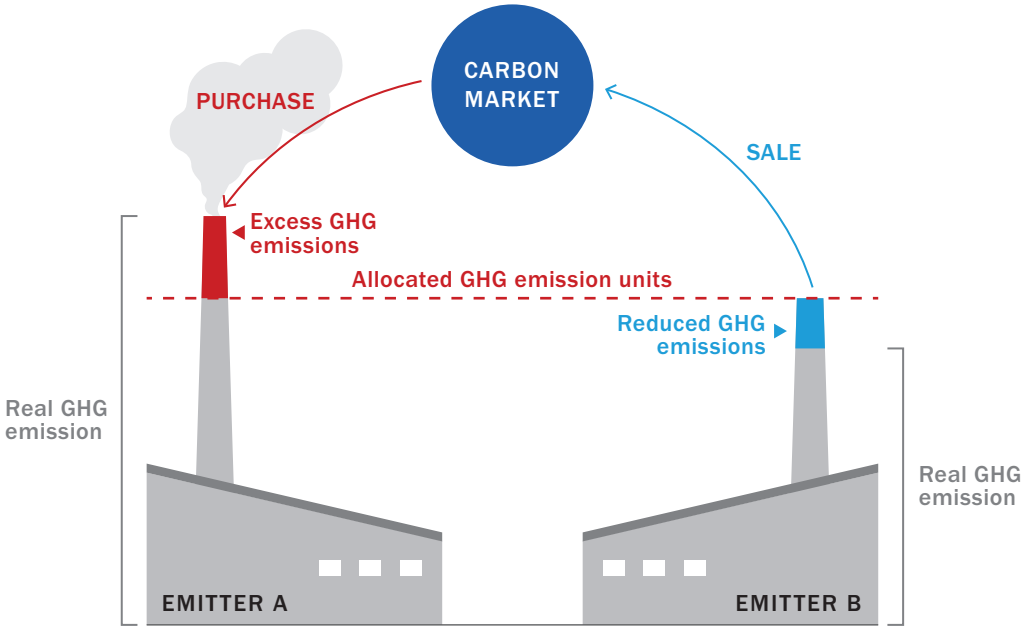
* This map is a graphic representation only. It has been amended and edited from the original source diagram referenced here.

REDUCING EMISSIONS INTENSITY AND DRIVING ENERGY EFFICIENCY THROUGH ETSs

An emissions trading system (ETS), often referred to as a cap-and-trade system, is a market-based policy tool designed to reduce greenhouse gas (GHG) emissions. Under an ETS, a government sets a cap on the amount of GHGs that industries can emit. Companies can then trade emission allowances in a regulated market, creating a financial incentive to reduce emissions. ETSs are gaining significant momentum globally, with emerging economies playing a key role.

Although emission levels are influenced by a range of economic, political, and social factors, an ETS can ensure emissions remain at or below a specified limit across the covered sectors, as determined by its cap. This cap can be absolute or intensity-based: absolute caps define a maximum limit on emissions while intensity-based targets are set relative to an underlying metric, such as emissions per unit of output or GDP. This encourages businesses to optimize their energy use and reduce waste, lowering operational costs while meeting compliance requirements. If legislation is robust and stable over time, an ETS will allow emissions reduction targets to be met with a high degree of certainty. Research shows that ETSs have achieved their reduction targets, driving abatement by creating a financial incentive for companies to adopt cleaner, more efficient technologies[9].

FIGURE 2: HOW AN ETS WORKS[10]



THE EVOLUTION OF THE INDIAN CARBON MARKET: FROM PAT TO CCTS

India's journey toward a robust carbon market framework has evolved significantly over the years, reflecting its growing commitment to decoupling economic development from emissions. The first step toward market-based mechanisms for energy efficiency improvements was the Perform, Achieve and Trade (PAT) scheme, introduced in 2012. PAT targeted large energy-intensive industries, requiring them to achieve specific energy-saving targets. Excess savings were converted into Energy Saving Certificates, which could be traded among entities. This approach not only promoted energy efficiency but also paved the way for broader market-based initiatives[11].

Building on this foundation, the Government of India laid the legal groundwork to establish a carbon market in 2022 by amending the Energy Conservation Act of 2001[12] and notifying the Carbon Credit Trading Scheme (CCTS) in June 2023[13]. This marked a shift from focusing specifically on energy savings to more comprehensively addressing GHG emissions reductions and aims to integrate existing mechanisms like PAT and renewable energy certificates into a unified carbon trading framework.

The CCTS introduces two mechanisms to facilitate emissions intensity reduction in India:

1. **The Compliance Mechanism mandates GHG emission intensity targets to obligated entities in nine sectors with high emissions reduction potential.** Obligated entities[a] that achieve emissions below their targets are issued Carbon Credit Certificates (CCCs), while those that fail must purchase or surrender equivalent CCCs. The sectors include steel, cement, aluminium, fertiliser, textile, paper & pulp, petrochemical, petroleum refinery, and chlor-alkali.

2. **The Offset Mechanism allows non-obligated entities to voluntarily register projects that reduce, remove, or avoid GHG emissions for the issuance of CCCs.** It incentivizes mitigation actions in sectors not covered under the compliance mechanism, such as energy, agriculture, forestry, and transport. Projects undergo a detailed approval process and a project cycle before CCC issuance. Over time, additional sectors, including fugitive emissions and carbon capture, will be included using a phased approach[14].

a Obligated entities refer to the entities registered within CCTS compliance mechanism to comply with the GHG emission norms specified. Non-obligated entities are the registered entities within CCTS which can purchase the carbon credit certificates on voluntary basis.

THE OPPORTUNITIES OF ETSs TO UNLOCK BUSINESS VALUE

ETSs hold the promise to deliver benefits to obligated entities in terms of emissions reductions, economic performance, innovation, and international trade competitiveness. These outcomes have been a major subject of research in ETSs across the globe for decades. This section discusses the evidence for each of these outcomes.

EMISSIONS REDUCTIONS

Despite the caveat above on the scope of existing research, nevertheless it is clear that overall, research indicates that ETSs contribute to substantial emissions reductions.

A systematic review of 21 carbon pricing schemes (both carbon taxes and ETSs, covering a wide range of sectors) found that at least 17 of these policies led to immediate and significant emissions reductions, estimated to be between -4 to -15% across schemes, even when carbon prices were low[3]. However, these differences are driven by policy design and context, and the effectiveness of carbon pricing is highly dependent on its context. For example, the sectoral coverage of schemes alone does not seem to be a significant factor in determining the level of emissions reductions[3]. The price of allowances could be a potentially significant factor in driving emissions reductions, but the relationship between carbon prices and emissions is not always clear (see the Research Note for additional details)[3].

ETSs contribute to substantial emissions reductions.

EU: The EU ETS — one of the most thoroughly studied carbon pricing schemes due to its longevity and scope — has played a key role in driving significant emission reductions. Since its inception in 2005, emissions from covered sectors have declined by nearly 50%. These reductions were a result of a combination of factors, including the EU ETS's carbon price, shifting fuel economics and fuel switching, renewable energy policies focused on decarbonizing the power sector, and efficiency improvements[15,16]. On average, the EU ETS is estimated to have reduced emissions by over 7%, even under low prices between 2008 and 2016, the EU ETS is estimated to have saved about 1.2 billion tons of CO2, accounting for almost half of EU governments' commitments under the Kyoto Protocol[17].

China: China's eight pilot ETSs are estimated to have reduced emissions by an average of 13%[3] and reduced energy intensity by around 20% at both the firm and sector level[18,19]. These outcomes were likely accompanied by energy efficiency improvements in high-carbon enterprises located outside of the pilot regions, indicating that the ETSs may have indirectly impacted non-regulated companies as well[20].

Chile: Since its implementation, Chile's carbon tax has led to a decline in national CO_2 emissions by 4.5%–5.4%, with taxed thermoelectric generation units seeing even greater reductions of 15.3%–18.2%. This decline is largely attributed to a 12.9%–15.2% drop in fossil fuel consumption within these plants, alongside a 15.1%–15.8% reduction in electricity generation. While this reduction stems from a carbon tax rather than an ETS, it highlights how carbon pricing mechanisms can drive substantial emissions cuts in energy-intensive sectors[20].

BOX 2: Case Study - the EU ETS

About the EU ETS

The European Union Emissions Trading System (EU ETS) is the oldest cap-and-trade system in force. It is a cornerstone of the EU's policy framework to combat climate change and reduce GHG emissions cost-effectively. The EU ETS applies to emissions from the power sector, manufacturing, industry, and intra-EU aviation. Auctioning is the main method of distributing allowances, with some free allocation, based on benchmarks[21].

- Phase 1 of EU ETS (2005–2007) served as a pilot to test carbon price formation and establish the necessary infrastructure for a functional carbon market. Initially covering the EU27 countries, it later expanded to include Bulgaria and Romania in 2007 upon their EU accession. Almost all allowances were free.
- Phase 2 (2008–2012) introduced more binding commitments, lowering the cap on allowances although around 90% of the emission allowances were still allocated for free. Penalty for non-compliance was increased. This phase also marked the inclusion of Norway, Iceland, and Liechtenstein.
- Phase 3 (2013–2020) replaced varied national systems with a unified approach. A single EU-wide cap on emissions was introduced, allocation rules were harmonized, and auctioning became the default method for allocating allowances.[22].
- The current phase, Phase 4 (2021–2030), aims for 62% reduction in emissions from 2005 levels by progressively tightening emission caps and reducing free allowances[19].

Emissions Reductions

The EU ETS has had a significant impact on reducing greenhouse gas emissions across covered sectors. Evidence from various studies underscores that the EU ETS has driven emissions reductions without harming firm competitiveness. Studies of the system's early phases reveal that the ETS played a pivotal role in achieving these reductions.

- During Phase 1 (2005–2007), the ETS led to a modest but notable 3% reduction in total capped emissions[23].
- Higher stringency in Phase 2 (2008–2012) further drove abatement. Estimated CO_2 savings between 2008 and 2016 translated to a reduction of about 7.5% of the emissions covered under EU ETS, or 3.8% of EU's total emissions[21]. Some studies found that there were significant emissions reductions only during Phase 2 of implementation, suggesting that more stringent requirements were necessary[24].
- Between 2005 and 2015, emissions from sectors covered by the EU ETS declined by 24%, exceeding the target to reduce emissions by 21% by 2020[25].
- From the time of its inception in 2005 through 2024, emissions from EU ETS sectors have declined by 48%[19].

ECONOMIC PERFORMANCE

In aggregate, ETSs have positive or neutral impacts on economic performance and firm-level outcomes.

Various sector- and firm-specific analyses suggest that ETSs may improve or have no impact on economic performance — which can be measured by variables such as revenues, employment, or closure rate.

ETSs have positive or neutral impacts on economic performance and firm-level outcomes.

EU: In the EU, the ETS likely had positive economic impacts for regulated firms. Some sectors have benefitted more than others, but on average, no sectors were negatively impacted by the EU ETS. For example, regulated firms in the EU ETS saw higher increases in revenues and fixed assets than non-regulated firms — with revenues being ~16% higher and fixed assets being ~8% higher for ETS-covered firms, on average. Employment, profits, returns on assets, and closure rate were not measurably impacted. The improvements in revenue, specifically, were driven by gains in the minerals, metals, and electricity & heat sectors. Overall, the electricity & heat sector benefited the most with additional increases in fixed assets, employment, and return on assets[26].

Manufacturing firms in the EU during Phases 1 and 2 (between 2005-2012) of the EU ETS experienced positive impacts on turnover, markup, investment intensity, and labour productivity[27]. Regulated manufacturing firms in France and Germany specifically were found to have reduced their carbon emissions by around 15%-20% with no clear negative impacts across a range of financial indicators[28,29].

China: In China, the ETS pilots reduced operating costs and improved profitability and firm value, though this result was more significant for state-owned enterprises[30].

INNOVATION

ETSs can be important drivers of technology adoption, research & development (R&D), and patenting.

Innovation can be measured in many different ways. Evidence suggests that ETSs have significantly increased technology adoption, innovation through patenting, and, to a lesser extent, spending on R&D. However, because innovation can be defined in many different ways, and sometimes difficult to measure, these outcomes may not fully capture other effects such as changes in operational strategy or adoption of already available technologies[31], and studies that examine a wider range of metrics have demonstrated other potential positive impacts.

ETSs can be important drivers of technology adoption, research & development (R&D), and patenting.

EU: One study of 800 farms from six EU countries participating in the EU ETS found that over 60% of them have actively invested in energy efficiency, GHG reduction measures, while 70% invested in low-carbon R&D[32]. Another study tracked low-carbon patenting and found that the EU ETS increased innovation in regulated firms by as much as 10%. Overall, low-carbon patenting increased by around 1%, suggesting that innovation by non-regulated companies was not negatively impacted[27]. British firms likely increased both patenting and R&D spending under the EU ETS, with further analysis suggesting that they favoured innovation over the adoption of existing technologies[33].

China: A comparison of regulated sectors in China's pilot ETS regions with unrelated sectors in non-pilot regions found that the ETS implementation accelerated innovation, and stronger effects occurred in regions with higher carbon prices or high turnover rates of allowance trading[34]. Compliance with pilot ETSs appears to have led to increased technological innovation, based on patent and entrepreneurship data[35]. Ultimately, the research is not conclusive but is somewhat promising.

INTERNATIONAL TRADE COMPETITIVENESS

Particularly with the advent of carbon border adjustment mechanisms (CBAMs), industries could become more competitive if they are covered by a domestic ETS.

With the advent of carbon border adjustment mechanisms (CBAMs), industries could become more competitive if they are covered by a domestic ETS.

An oft-cited concern with ETSs is the risk of "carbon leakage." Theoretically, businesses exporting to international markets may lose competitiveness if their pricing includes the costs of emissions, while global competitors in non-regulated regions are exempt from carbon prices and subsequently have lower operating costs. There is the potential risk that industries – primarily highly emissions-intensive and trade-exposed sectors – may relocate to areas with a lower or no carbon price, resulting in decreased profits and job losses. Leakage could also undermine the intended environmental outcome of reduced GHG emissions, resulting in a loss of competitiveness without an environmental gain[2].

However, there has been little evidence to date that carbon pricing has resulted in leakage. There may be several reasons for this, such as generally low or moderate carbon price levels and protections for at-risk sectors. In addition, tax rates, labour availability, and infrastructure may play a bigger role in investment decisions than environmental regulations[2].

Nonetheless, leakage continues to be a heavily debated and researched subject, and the risk of leakage may increase in tandem with higher carbon prices. For example, a 2024 study showed that leakage has occurred from the EU ETS, and, despite lower emissions from the EU itself, resulted in a small net increase in emissions[36].

To address the risk of leakage, several jurisdictions – most notably the EU – are considering or implementing a carbon border adjustment mechanism (CBAM), also known as a border carbon adjustment. CBAMs are intended to help reduce leakage by putting a carbon price on imported goods that is equal to the domestic carbon price.

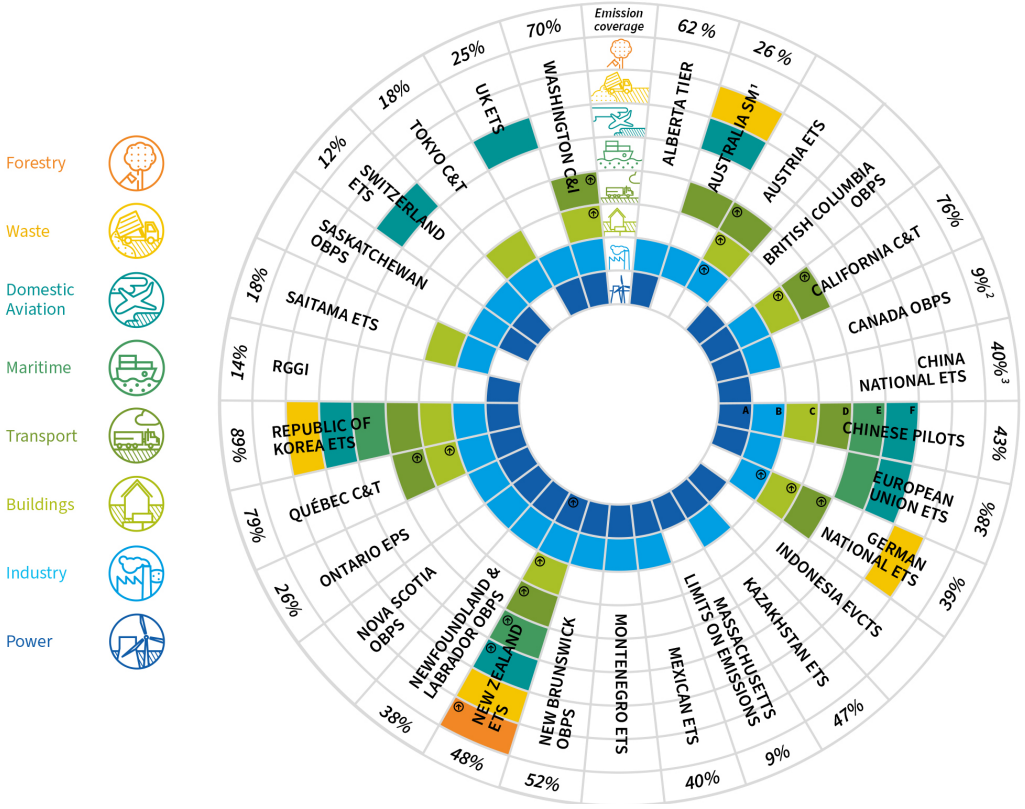
Since CBAMs make carbon-intensive goods less competitive, industries operating under a carbon price could become more competitive than their competitors in non-regulated regions. Under the EU's CBAM, firms will be exempted, at least in part, from purchasing CBAM certificates when importing into EU borders if they are paying an equivalent carbon price in their country of origin. Compliance obligations under CBAM are expected to begin in 2026, when its definitive phase enters into force. Other countries are following suit, such as the United Kingdom, which announced its own CBAM would take effect in 2027. For industries exporting to any jurisdiction with a CBAM, the presence of a domestic ETS could ensure that funds that would otherwise be diverted by CBAM fees are instead used toward domestic decarbonization efforts.

RESEARCH NOTE

Although research supports the benefits of ETSs, it is also highly nuanced. It is important to note challenges and gaps in the available literature.

It is inherently challenging to generalize across ETSs. Carbon pricing schemes are very diverse and differ in terms of design, scope, prices, timeframes, and broader policy contexts. The effectiveness of carbon pricing is highly dependent on this context. For example, some ETSs target the industrial and energy sectors, while others focus on households and transport. Furthermore, comparisons over time must account for the fact that technical progress and other changes occur in parallel with carbon pricing policies. Academic studies are often specific to certain sectors, regions, and time periods. As a result, it is difficult to draw definitive conclusions that apply universally across ETSs[3].

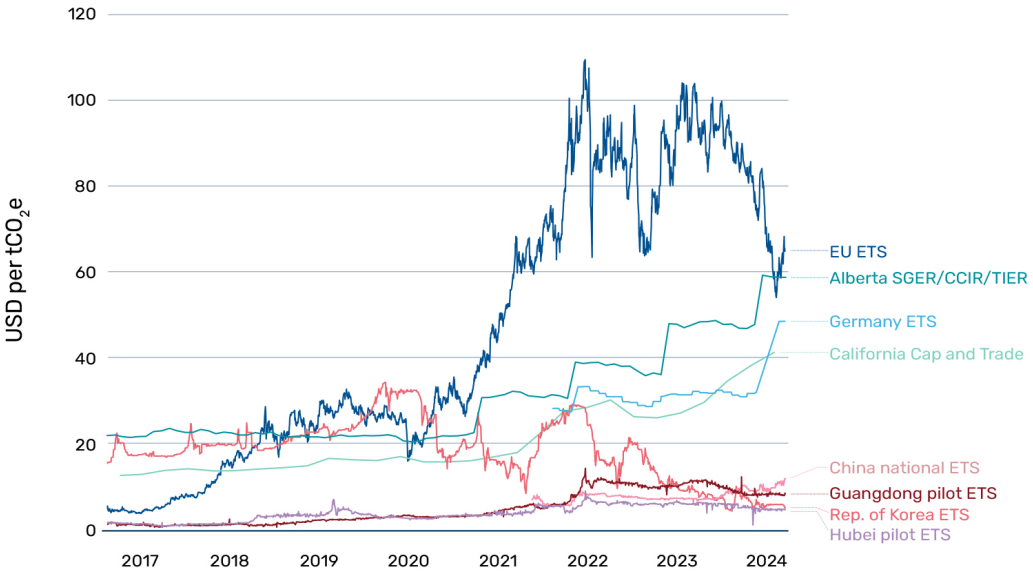
FIGURE 3: SECTORS COVERED BY EMISSIONS TRADING ACROSS SYSTEMS[6]



There are significant gaps in the available research. Although some ETSs like those in the EU, China, and the US have been studied more extensively, dozens of existing carbon pricing schemes have not yet been evaluated. More rigorous analysis and research are required across a range of outcomes to better understand how to maximize the success of ETSs[3].

The relationship between carbon price levels and emission reductions has not been extensively studied[3]. Although global carbon prices have risen significantly over the last few years, there is a particular lack of analysis of higher carbon prices above US$30 per tonne[37]. This is especially relevant in the context of the EU ETS, where prices have risen sharply over the course of its implementation, from an average price of less than US$10/tonne between 2012 and 2018, to a peak of $110 in 2022[38]. Logically, it would make sense that there would be a strong relationship between carbon prices and emissions, i.e., if prices go up, emissions would go down because obligated entities would have a stronger incentive to reduce their emissions. Related policies have shown similar relationships, such as higher fuel taxes reducing demand for gasoline and diesel[39]. If the same logic holds, then the results of earlier research carried out in an environment of lower prices may not be as accurate under today's higher prices.

FIGURE 4: NOMINAL PRICES IN THE LARGEST ETSs IN OPERATION SINCE 2017[40]



KEY ETS DESIGN ELEMENTS THAT INFLUENCE CORPORATE PERFORMANCE

Globally, ETSs are very diverse and differ widely in terms of their specific policy design, scope, and context. The effectiveness of carbon pricing is highly dependent on the context, and impacts could be higher or lower based on the institutions and infrastructures. However, several specific design elements of an ETS emerge as particularly important for covered entities, including emissions caps and targets, allowances, offsets, and policy and regulatory certainty.

EMISSION CAPS AND TARGETS

What are emissions caps and targets?

A cap on emissions is a cornerstone of an ETS. There are two kinds of caps: an absolute cap or an intensity-based cap. An absolute cap on emissions determines the total volume of GHG emissions that can be released by covered entities over a specified period, while an intensity-based cap sets a limit on GHG emissions relative to a specific measure of economic output, such as emissions per unit of production or GDP.

Absolute caps can strengthen the impact and integrity of an ETS as a climate policy by directly limiting overall emissions, but both approaches can be equally stringent in terms of limiting emissions[41]. Absolute caps are more common, but intensity-based emissions trading systems are on the rise, including the output-based pricing systems in place in Canada[6]. The Chinese national ETS, which is currently an intensity-based cap, is considering setting an absolute cap instead, contingent on their emissions peak[42].

One intensity-based approach is through a 'baseline-and-credit' scheme, where participating entities are assigned a target emission level or emission intensity pathway. In this system, the baseline serves as a reference trajectory between present to a future target, against which performance is measured. If actual emissions fall below this baseline, the difference qualifies as emissions reductions and is eligible for credits[43]. Australia reformed its Safeguard Mechanism to a mandatory intensity-based baseline-and-credit system and Japan launched its GX-ETS as a voluntary baseline-and-credit system in 2023[6].

How do caps impact business?

- **Setting the cap:** The design and implementation of a cap directly impact corporate strategies, operational planning, and overall participation in the system. Businesses respond differently to the stringency, trajectory, and flexibility of the targets, making these elements critical in shaping their decisions. Stringent targets incentivize more substantial emissions reductions but can increase compliance costs and negatively impact profitability. Conversely, lenient targets may lower incentives to innovate and dilute the scheme's overall effectiveness.

- **Determining the type of cap:** Intensity-based caps can provide more flexibility for economic growth by allowing emissions to vary with economic activity and companies to respond to changes in demand and output while incentivizing industries to reduce emissions per unit of output. Intensity-based caps may be more manageable in initial stages for both companies and for governments, as they offer more control over economic impacts. This approach is particularly suited for developing economies where there is greater uncertainty about future output and demand growth[44].

Context to CCTS

- **CCTS is a baseline-and-credit system**, like its predecessor, the PAT scheme. Instead of establishing an overall cap on the volume of emissions, CCTS will set GHG emission intensity targets, measured as emissions per unit of output. Sectoral GHG emission intensity trajectories will be developed, informed by India's Nationally Determined Contribution (NDC), available technologies, costs, and decarbonization potential in each sector. Annual GHG intensity targets for each obligated entity will be set relative to the lowest intensity levels in their respective sub-sector. Obligated entities must achieve annual GHG intensity targets for a specified trajectory period. The targets will be subject to regular review and update to ensure alignment with national climate goals[45].

- **CCTS incentive structure:** Entities exceeding their GHG intensity reduction targets receive Carbon Credit Certificates (CCCs) proportional to their performance (difference between target and achieved intensity multiplied by production). Entities failing to meet targets must surrender CCCs or purchase additional ones to offset their excess emissions, ensuring accountability and compliance[45].

Key Business Impacts

Flexibility: Enabling growth while driving decarbonization

For a rapidly growing economy like India, where industries are scaling up production to meet domestic and global demand, absolute emission caps, if too stringent, may constrain economic expansion. CCTS offers businesses the much-needed flexibility to adjust emissions based on their economic output, allowing for growth while still driving decarbonization. CCTS enables companies to increase production and emissions as long as they maintain emissions intensity below their benchmark. This is particularly relevant for energy-intensive manufacturing industries, which are integral to India's economic aspirations.

Energy efficiency: Driving cost-effective resilience
CCTS incentivizes businesses to adopt more energy-efficient technologies by linking emissions reduction targets to GHG intensity rather than absolute emissions. This drives continuous innovation in process optimization, fuel switching, and adoption of renewable energy sources, which not only reduce emissions but also enhance competitiveness by lowering operational costs.

Market stability: Mitigating economic and production fluctuations
CCTS, with intensity-based caps, reduces the risks associated with economic fluctuations, such as demand shocks, recessions, supply chain disruptions or production fluctuations. Since targets are set relative to output rather than as fixed caps, firms do not face undue penalties during low-production periods, nor are they discouraged from ramping up production when economic conditions improve. This stability makes CCTS more adaptable and less disruptive to industries.

Equity and feasibility: Sector-specific roadmaps
By creating a sector-specific roadmap, CCTS accommodates the unique characteristics of different industries, including their specific baselines, decarbonization potential and technological realities.

Granularity and accountability
CCTS has a two-tiered structure. Sectoral trajectories provide high-level reduction blueprints, while entity-specific targets create accountability for individual firms.

ALLOWANCES AND ALLOCATION

What are allowances?

Emissions "allowances" – also sometimes called "permits" – correspond to one unit of emissions (typically one tonne). Regulated participants in an ETS are required to surrender one allowance for every unit of emissions for which they are accountable.

If an obligated entity overachieves its emissions intensity target, it can earn allowances based on the difference between the achieved and the targeted emissions intensity. Similarly, if an obligated entity underachieves its targets, it will have to surrender or purchase a corresponding number of allowances to ensure compliance. Allowances can be traded on a registry or trading platform.

Allowances can be allocated freely to covered entities by the government (based on some combination of past emissions, output and/or performance standards), purchased from the government (typically through auctions), or purchased from other entities that have excess. Some ETSs use a hybrid model of free allocation and auctioning. In many ETSs, the volume of available allowances decreases over time.

Participants can also choose to bank allowances for future use. They may also be able to use eligible units from other sources, such as domestic carbon credits (from sectors outside the cap), international crediting mechanisms, or other ETSs.

How do allowances impact business?

The impact of allowances on business largely depends on how many there are and how they are allocated. Firms that emit less than their allocated allowances can sell the excess, while those exceeding the cap must purchase additional allowances, creating a financial incentive to lower emissions.

Free allocation of allowances can benefit industries that are vulnerable to competitiveness impacts, like trade-exposed sectors. If allowances are allocated too generously, however, it may reduce the incentives to innovate and decarbonize. Some evidence suggests that the strategic use of free allocation of emissions allowances to manage the distributional and leakage effects of emissions trading has made it easier to secure political support[6]. In some cases, allowances can be converted into assets on companies' balance sheets. The impact of this may be material, depending on the price of allowances, and on whether allowances can be booked at their market value. In this way, free allocation can be seen as an operating subsidy.

Auctioning can encourage efficient resource allocation but imposes higher upfront costs on businesses. However, auctions can also generate government revenues, which could then be recycled, for example, for complementary policies and incentives for decarbonization, or to contribute to public benefits that could help raise public approval of the carbon pricing policy[46,47].

Hybrid models of allocation – a combination of free allowances and auctioning – can balance cost burdens and incentives for efficiency. Allocation methods can also vary across sectors. For example, the power sector is a common candidate for auctioning as it is often less prone to carbon leakage, while manufacturing sectors have typically received some form of free allocation, at least initially[41].

Context to CCTS

- **In the CCTS, the allowances are referred to as Carbon Credit Certificates (CCCs).** CCCs are tradable instruments within the CCTS framework and only issued to obligated entities that outperform their GHG emission intensity targets. The total number of CCCs issued depends on the reduction achieved by each obligated entity relative to its baseline, target emissions, and the economic output of the entities (i.e., production levels). There is no free allocation in the CCTS framework, as a baseline-and-credit system. Instead, entities must earn CCCs by meeting or exceeding targets.

- **No auctioning:** CCCs are generated from actual emission reductions rather than being auctioned upfront. The system will be performance-based where the price of CCCs will depend on the balance of supply (from overperformers) and demand (from underperformers) in the trading market.

- **Banking and borrowing:** Obligated entities can save or bank unused CCCs from a compliance year and use them to meet targets or sell within the Indian Carbon Market in subsequent compliance years. There is no provision of borrowing as of now.

Key Business Impacts

No upfront costs: Lower financial burden
Unlike a conventional allowance allocation model, CCTS eliminates initial financial barriers as businesses will not face the upfront cost of buying CCCs through auctions at the start of compliance cycles, which allows more flexibility in allocating resources for emissions reductions or operational needs. This could be especially beneficial for smaller companies.

Incentives for early action: Directly rewarding low-carbon investments
Rather than relying on purchasing allowances to cover emissions beyond their targets, the system focuses on performance, directly rewarding businesses for early adoption of energy efficient and low-carbon technologies.

Simplified operations: Lower administrative complexity
Participating in allowance auctions requires financial and strategic expertise, especially for businesses new to carbon markets or those with limited resources. CCTS eliminates these complexities and simplifies compliance, without the need to participate in auctions.

Risk of market imbalances and volatility
Without auctioning, the supply of CCCs will be tied directly to the performance of obligated entities. This could potentially cause a market imbalance. If a large number of obligated entities significantly outperform their targets, the market could be flooded with credits, driving down prices and reducing incentives for further reductions. Conversely, if many entities fail to meet their targets, there may be an insufficient supply of credits, making compliance costly. Businesses may not have a clear indicator of scarcity or oversupply of CCCs creating market volatility.

Limited Price Signals: Uncertainty in compliance costs
Auctions typically help establish clear and transparent carbon price signals. Without them, prices will be determined by supply and demand dynamics in credit trading, which could lead to price volatility and less predictable compliance costs. Though there will be a price range in the CCTS (with floor and forbearance price), volatility can still be impacted. A market that is either pegged to the floor or forbearance price at all times is either over- or under-allocated.

Banking: Smoothing compliance cost and supporting market liquidity
The ability to bank surplus credits for future compliance allows businesses to manage compliance costs over time. This enables better planning to meet targets and supports market liquidity.

PRICE MANAGEMENT MECHANISMS

What determines the price of allowances?

Because allowances are traded in a market, their prices are determined by market forces. The cap on emissions creates scarcity of allowances, which dictates the demand and supply of allowances, creating an incentive to reduce emissions.

Globally, carbon prices in ETSs vary widely. In 2024, prices ranged from less than US$1/$tCO_2e$ in Indonesia to as much as US$61/$tCO_2e$ in the EU[48]. However, carbon prices would globally need to be in the $63-127/$tCO_2e$ range by 2030 to keep a rise in global temperatures below 2°C[18].

Additional mechanisms can be used to support price predictability, cost containment, and effective market operation. Although prices are determined through supply and demand in the marketplace, there are often complementary policies, such as a floor price, ceiling price, or market stability reserve, to stabilize prices and reduce volatility, providing predictable signals for planning and investment.

What are the different price management mechanisms?[49]

- **Responding to low prices:**
  - Price floors are used to avoid the negative consequences of low allowance prices, which can reduce incentives for investments in low-carbon technology. The two key types of price floors are: a) Auction Reserve Price: A minimum price set at auctions, below which allowances cannot be sold, b) Hard Price Floor: A guaranteed minimum price for allowances, where the government buys back allowances at a predetermined price if necessary.
  - Emission Containment Reserve (ECR): ECR is designed to automatically reduce a fixed quantity of the allowance supply when allowance prices fall below the established trigger price. Unlike in an auction reserve price, withheld allowances not intended to be available for future sale.

- **Responding to high prices:**
  - Cost Containment Reserve (CCR): A reserve of allowances made available when allowance prices exceed a predefined trigger. This reserve is a 'soft' price ceiling, allowing for additional allowances to be released into the market when necessary.
  - Hard Price Ceiling: This sets an absolute upper price for allowances, ensuring no entity will pay more than this ceiling price.

- **Combined mechanisms:** Some ETSs use a combination of price stabilization tools to create a price 'corridor' within which allowance prices can fluctuate. For example, the Regional Greenhouse Gas Initiative (RGGI) in the US combines an auction reserve price, a CCR, and an ECR to withhold allowances when prices fall too low. California's Western Climate Initiative (WCI) system has both an auction reserve price and a CCR, as well as a hard price ceiling introduced in 2021.

- **Market Stability Reserve (MSR)** or quantity-based mechanisms: Some systems, like the EU ETS Market Stability Reserve, adjust the supply of allowances based on the volume in circulation, adding or subtracting allowances to maintain a balanced market. This helps ensure the carbon price signal stays effective, particularly in times of surplus or shortage.

How do allowance prices impact business?

Allowance price levels are critical, as they create the price signal to participating entities to decarbonize. A more stringent cap translates into lower allowance supply, so—all other things being equal—the allowance price will tend to be higher, creating a stronger incentive. The ability to trade on the market also results in price convergence and a uniform price signal, which in turn favours lower-emission goods and services[41]. ETSs that have low carbon prices may not provide strong enough incentives for innovation in emissions reduction technologies, while higher prices drive innovation and clean technology investment but can strain finances for businesses unable to adapt quickly.

- **Price stability:** Price floors and ceilings provide businesses with greater price predictability, reducing the risks of sudden market fluctuations. This helps businesses plan their investments in low-carbon technologies and emissions reductions more effectively.

- **Market uncertainty:** Auction reserve prices can help businesses avoid the uncertainty of unsold allowances and the potential for price crashes, although they might face periods where not all allowances are available at auction, temporarily reducing supply.

- **Compliance cost:** Businesses may face higher costs in absence of a hard price ceiling, especially during periods of high demand for allowances.

- **Forecasting difficulties:** Companies often struggle with long-term planning due to uncertain regulatory and market dynamics.

- **Liquidity issues:** Some ETS markets are shallow, limiting opportunities to trade permits effectively.

- **Oversupply of credits/limited incentives for innovation:** Low allowance demand (e.g., due to weak caps) can reduce the effectiveness of carbon pricing as a driver for change. ETS mechanisms that rely heavily on free allowances or have low carbon prices may not provide strong enough incentives for innovation in emissions reduction technologies.

For example, in its early phases, the EU ETS faced criticism for an oversupply of allowances, resulting in low carbon prices and insufficient incentives for businesses to cut emissions. Subsequent reforms, such as introducing the Market Stability Reserve, helped address these issues.

Context to CCTS

- **A combined price management mechanism:** CCTS will have a floor price, forbearance price, and penalty from the outset of the system and plans to introduce a market stability reserve at a later stage. Without the provision of auctioning, there will also be no provision for the government to buy back unsold CCCs.

Key Business Impacts

Price floor: Ensuring stability but raising potential liquidity challenges
The price floor acts as a safeguard, ensuring that CCC prices do not trade below a minimum price. This stability encourages long-term investment in low-carbon technologies, as businesses can predict a baseline return on carbon mitigation efforts. However, without a buyback mechanism (where the regulator purchases surplus CCCs at the floor price), businesses may face liquidity challenges if market demand is weak. If supply far exceeds demand, businesses might struggle to sell their surplus CCCs even at the floor price, potentially leading to stranded credits and financial losses.

Forbearance price: Capping compliance costs and reducing market volatility
The forbearance price will act as a cap on the compliance cost by allowing companies to fulfill their obligations at a predetermined fixed rate when CCC market prices exceed this limit. This protects businesses from excessive price spikes and unpredictable financial burdens, ensuring compliance remains affordable.

Market Stability Reserve (MSR): Long-term price stabilization
Once introduced, MSR will help balance CCC supply and demand by adjusting CCC availability based on total market circulation. This mechanism will enhance price predictability. However, until then the supply-demand mismatches could lead to short-term price swings, making it challenging for businesses to plan carbon trading strategies. Without a mechanism to absorb surplus credits or release additional supply when needed, CCC prices could experience periodic volatility, affecting both buyers and sellers.

CARBON CREDITS

What are carbon credits?

Carbon credits represent emissions reductions and removals (typically designated as tCO_2e) resulting from projects undertaken outside the scope of an ETS. Credits can provide additional flexibility in reaching emissions targets under ETSs and provide financial incentives to undertake projects that reduce emissions in a wider set of sectors[50].

ETSs vary widely in how much of a compliance entity's obligations can be met through offsetting credits. Several systems – such as those in the EU and UK – do not permit the use of credits at all, while some place a limit on the use of offsets. For example, Mexico's ETS permits use of credits up to 10%, and China ETS limits the use of offset credits at 5%. Others, like Kazakhstan's, have no limit to the use of credits, allowing an entity to use offsets to meet 100% of its obligations[6].

It is also important to note that the scope of carbon credits used within a compliance market context may differ from carbon credits purchased on the global voluntary carbon market that are used to "offset" emissions, e.g., of corporations' carbon footprints.

How do credits impact business?

Credits can provide a way for liable entities to meet their liabilities at lower cost, i.e., mitigation at a lower cost to what would be achieved in their own operations but can lead to quality concerns if not well-regulated.

Context to CCTS

The CCTS will include a crediting mechanism where non-obligated entities may voluntarily participate by registering their projects for the issuance of Carbon Credit Certificates (CCC). This mechanism will enable country to tap mitigation from sectors not covered under the compliance mechanism, such as forestry and agriculture, and can incentivise mitigation in those sectors.

Several details about the crediting mechanism are still under consideration. For example, there is not yet a clear indication if there will be a limit to the amount of offsetting permitted for compliance entities to meet their targets. A detailed procedure on the crediting mechanism is expected soon, which will elaborate on key details such as eligibility requirements and the project cycle.

Key Business Impacts

New revenue opportunities for non-obligated entities
The inclusion of an offsetting mechanism creates new financial incentives for sectors traditionally outside compliance markets, like forestry, agriculture, waste, transport, etc., encouraging investment in emission reduction projects.

Potential for new business models
If well-structured, aligned with the international voluntary market developments and effectively regulated, this mechanism could broaden participation in India's carbon market, diversifying market supply and creating new business models for sectors requiring financing.

POLICY AND REGULATORY CERTAINTY

What is policy and regulatory certainty?

As in any other context, participants under an ETS require a level of certainty and consistency in the overall policy direction and what regulations will follow to achieve policy objectives.

How does it impact business?

Businesses require long-term clarity in carbon pricing frameworks in order to make strategic, low-carbon investments that will align with future requirements. Uncertainty or inconsistency in policy frameworks can deter investment in green technologies and infrastructure, delaying progress toward decarbonization[4]. Uncertainty about the future existence of a carbon price can hinder investment and uncertainty about future price levels can increase the resource costs of carbon pricing[51,52]. Unclear or frequently changing rules discourage investment in low-carbon strategies, as businesses may delay action until the regulatory landscape stabilizes. Frequent policy revisions or inconsistencies between jurisdictions can undermine business confidence. For example, companies reliant on free allowances may face unexpected financial stress if allocation methods change.

Context to CCTS

The CCTS is a successor policy to the Perform, Achieve and Trade (PAT) scheme – a mandatory energy efficiency scheme covering more than 1,000 entities from 13 energy-intensive sectors. The carbon market will build on the existing infrastructure from the PAT scheme, such as MRV guidelines and administrative infrastructure. Furthermore, the compliance mechanism will provide additional options to decarbonize, beyond energy efficiency.

This creates some policy certainty because all of the nine obligated sectors[b] in the ICM are also obligated under the PAT scheme and would have some existing familiarity and capacity to meet policy requirements.

Key Business Impacts

Continuity and reduced transition risks
Since CCTS builds on the PAT scheme, businesses already participating in PAT will face fewer disruptions in adapting to the new carbon market.

Regulatory familiarity and capacity advantage
The nine obligated sectors under CCTS[b] are already covered under PAT, meaning businesses in these sectors have institutional knowledge and operational experience in emissions monitoring and compliance. This lowers the learning curve and ensures greater policy predictability, making it easier for companies to integrate carbon trading into their existing strategies.

b The nine obligated sectors under the compliance mechanism of the CCTS are: Aluminium, Cement, Chlor- Alkali, Fertiliser, Iron & Steel, Petrochemicals, Petroleum Refineries, Pulp & Paper, and Textile.

CONCLUSION

Indian industry's ability to innovate, especially when there is a clear business case for it, should not be underestimated. While the details of India's carbon market are still being determined, there are decades of global experience to draw from. It is important that companies are assured of transparent and consistent policy, and sufficient institutional capacity for systemic evaluations and course corrections. The stakes for companies and the country are high, with the tantalizing potential for India to become the world's first major economy to industrialize without carbonizing.

CCTS presents a transformative opportunity for businesses to align with India's decarbonization goals while unlocking economic and competitive advantages. By leveraging this market-based mechanism, businesses can optimize compliance costs, monetize emission reductions, and drive investment in low-carbon technologies.

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