Demystifying Carbon Emission Trading System through Simulation Workshops in India

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Issue Brief | September 2023

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Summary

In our efforts towards engaging relevant stakeholders in the preparatory phase prior to the establishment of the Indian Carbon Market (ICM), we realised that there is a limited understanding of an Emission Trading System (ETS) among Indian stakeholders and the importance of consistent engagement through capacity-building exercises. For capacity building of the stakeholders, we organised three workshops in Delhi, Mumbai, and Ahmedabad in February 2023 for more than 200 participants. Each workshop was followed by a question and answer (Q&A) session, which captured the initial reactions, hopes, and concerns of the relevant stakeholders. This issue brief summarises the proceedings of the workshops and highlights the important questions raised by the stakeholders. The important questions and concerns that emerged from the discussions (as collated and presented in this brief) are as follows:

- What could be the price of carbon in the ICM?
- What would be the role of the financial sector in the ICM?
- What key design aspects are relevant in the Indian context?
- How should entities design their long-term decarbonisation strategy in the presence of carbon trading?
- How is an emission intensity based ETS different from an absolute cap-based ETS?
- What role will the offset market play in the ICM?

- What are the trade balance- and equity-related issues under European Union (EU)-induced Carbon Border Adjustment Mechanism (CBAM)?
- How will the micro, small, and medium-sized enterprises (MSMEs) be impacted through an ICM?
- What is the role of policymakers in ensuring success of the ICM?

1. Introduction

The Government of India has recently passed the *Energy Conservation (Amendment) Bill*, 2022, which envisages a provision to develop an Indian Carbon Market (ICM). After an initial voluntary carbon market phase, the ICM is expected to include a national emission trading system (ETS) for sectors and entities that are already part of the *Perform, Achieve, and Trade (PAT) scheme*, including power- and energy-intensive industry sectors. Obligated entities will be given a greenhouse gas (GHG) emission intensity target aligned to India's overall targets and they can choose to abate and/or trade emissions allowances.

While Indian stakeholders have an experience in the offset market, there is still limited understanding of an ETS. Stakeholder engagements with Indian industry representatives conducted by the Council on Energy Environment and Water (CEEW) (Singh & Chaturvedi, 2023) reveal that educating the relevant stakeholders about the functional and operational aspects of an ETS is crucial.

In this context, CEEW, in partnership with the Asia Society Policy Institute (ASPI), International Emission Trading Association (IETA), Indian Institute of Technology, Bombay, Ahmedabad University, and Indian Institute of Management, Ahmedabad, conducted Emission Trading System (ETS) simulation workshops at Delhi, Mumbai and Ahmedabad for the benefit of the stakeholders. The 215 attendees of the workshop were from industry, financial institutions (domestic and international), academia, and civil society organisations.

The three workshops were limited-seating events, which provided a unique opportunity for its participants to learn how an ETS works through live in-person simulation sessions and associated training presentations and discussions. ETS simulation exercise remained the core focus of the workshop, but at the end of each session, we conducted a Q&A session to understand the perspectives and concerns of the stakeholders on the Indian Carbon Market.

1.1 Why ETS simulations?

ETS simulations help improve ETS literacy among the involved participants by providing a visual and interactive tool that allows the stakeholders better understand how the ETS works and its potential impacts. These tools can be used to build capacity of the stakeholders as they can test different scenarios and better prepare for the implementation of an ETS. Simulations can build support for the policy and reduce opposition from stakeholders by demonstrating the potential benefits of an ETS and addressing stakeholders' concerns. They can facilitate the testing of design options by enabling policymakers to explore different scenarios and evaluate their potential impacts before ETS is implemented in real time. Simulations can reduce ETS roll-out time by helping stakeholders to become familiar with the system before its official launch.

A simulation exercise is different from the real carbon market in the following ways (World Bank, 2020):

- A simulation exercise is a simplified and imperfect version of a real carbon market, which does not consider several factors that affect a real carbon market.
- A simulation exercise does not include crucial non-obligated financial players and instruments that greatly affect liquidity and price in a real carbon market.
- A simulation exercise needs the participants to take abatement decisions considering greatly simplified scenarios as compared to a real-life scenario where complex decisions need to be taken at an entity level.
- A simulation exercise runs for a shorter duration and limited number of years, which reflects in the decision making of the participants. In a real carbon market, participating entities invest in abatement technologies that would yield long-term cost benefits. However, in a simulation game, participants do not engage in investments with a longer timeframe benefits.
- A simulation exercise does not capture the impact of factors like disparate sectoral and economic growth or fuel subsidies.

> **Simulations help improve ETS literacy by providing a visual and interactive tool that allow better understanding of ETS and its potential impacts.**

2. Notes from speakers' presentations

2.1 Carbon pricing and markets

Why is it important to price greenhouse gas (GHG) emissions? Several extreme weather events and shifts in climate—for example, extreme droughts, glacial shrinking, and deforestation—are directly linked with GHG emissions, which are found to be largely responsible for climate change. The loss and damage caused by extreme weather events are not factored into the cost of production. This leads to market failure and presents a necessity to price GHG emissions. All GHG emissions are referred to in terms of CO2 equivalent (CO2e) and pricing them is termed as 'carbon pricing'. A carbon price essentially increases the price of fossil fuels and products that use these fuels, making them more expensive relative to low-carbon alternatives.

There are different mechanisms for pricing carbon emissions. At the national and international level, carbon pricing is driven by factors such as the macroeconomic environment, geopolitics, UN-driven framework, and national policy-driven framework. At the entity level, in addition to the above-listed factors, the other determinants of carbon pricing are company-level marginal abatement cost curves (MACC) and emission mitigation strategy. Pricing mechanisms, apart from an emission trading system (discussed in detail in section 2.2), that are adopted from corporate level to the international level are explained below:

Internal carbon price (ICP): ICP is used by corporations that want to factor in carbon price in their strategic decisions and investments with or without any regulation (for carbon pricing). Companies employing ICP as a tool for designing their strategies are preparing themselves for future carbon prices and risks arising from them and taking relevant decisions today. A CEEW analysis reveals that, in 2021, ICP was employed by 31 companies in India and 1,077 companies worldwide (CEEW Centre for Energy Finance 2023).

ICP can be employed in the form of shadow pricing, implicit pricing, internal carbon tax or fee, and internal trading mechanisms (CEEW Centre for Energy Finance 2023). In shadow pricing, a hypothetical price is assigned to a tonne of CO2e emissions, which then helps to assess future risks in the business. If an entity has resorted to emission mitigation measures (including buying offsets), the cost of abatement of per tonne CO2e is the implicit carbon price. Through an internal carbon tax, the entity taxes the emissions made by the business units and uses the revenue to invest in low-carbon technologies. Lastly, internal trading mechanisms work as an emission trading system wherein each business unit of an entity is provided with an emission target and units can trade among themselves to achieve the target cost-efficiently at an entity level.

Voluntary offset market: Voluntary offset market is the project-based offset market driven by private entities. In this market, an emission reduction/removal project is developed to generate offsets (tCO_2e) that can then be bought by corporations to fulfil their voluntary targets.

UN-driven offset market[1]: In 1997, the Kyoto Protocol introduced three global market-based mechanisms, such as the Clean Development Mechanism (CDM) and Joint Implementation (JI). Article 6 of the Paris Agreement introduced similar market mechanisms, including Article 6.2, which allows for direct bilateral cooperation and trading of Internationally Transferred Mitigation Outcomes (ITMOs). Article 6.4 is a multilateral baseline-and-credit system like CDM and JI Track 2 but with more stringent methodologies for additionality and conservative baselines. Existing CDM projects can transition to Article 6.4 if they have an active crediting period, but rules and methodologies for Article 6.4 are yet to be designed. COP27 did not make significant decisions on Article 6.4; so it may take time to come into force. The UN market is part of the compliance market, which helps countries achieve their Nationally Determined Contributions (NDCs).

Carbon Border Adjustment Mechanism (CBAM): The mechanism of pricing carbon emissions varies across jurisdictions, resulting in different carbon prices. The jurisdictions with more stringent emission reduction targets will likely have lower emission intensities and may have higher carbon prices as compared to jurisdictions with lenient targets. This differential may prompt entities to move relevant operations to jurisdictions with more lenient/less restrictive GHG limitations. Over time, this differential can contribute to

> A carbon price essentially increases the price of fossil fuels and products that use these fuels, making them more expensive relative to low-carbon alternatives.

1 For details on offset markets and emission trading systems (ETS), see Singh and Chaturvedi (2023).

the loss of industrial capacity and jobs away from high-carbon price jurisdictions to those with lower carbon prices. This phenomenon is called carbon leakage.

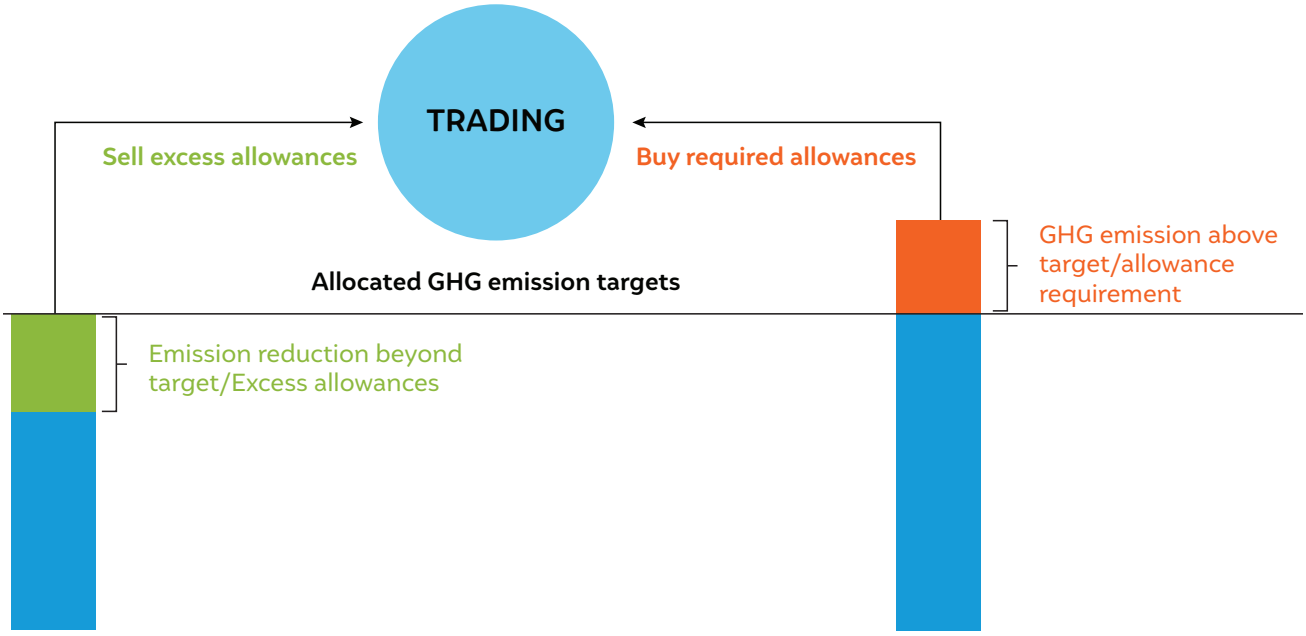
As a measure to safeguard their industry against carbon leakage and loss of competitiveness, certain jurisdictions with more stringent rules are planning to implement CBAM. A CBAM is the additional tax that importers will have to pay at the border based on the emission intensity of their products. Jurisdictions like the EU and the UK are planning to implement CBAM as soon as 2026. Others, such as the United States, are also discussing how and whether to impose a CBAM, both as a tool to protect their economies from carbon leakage and/or serve other objectives.

Carbon tax: A carbon tax is a flat tax charged on GHG emissions. Jurisdictions using a carbon tax can decide the structure (e.g., flat, progressive, or industry-specific) and on the price they want to put on emissions (and/or products) based on their emission reduction targets and charge entities based on how much they emit.

2.2 Introduction to emission trading systems

The emission trading system (ETS), also known as the 'cap and trade' mechanism, is a market-based approach for reducing GHG emissions. An ETS by design includes 'caps' or limits set on the total amount of certain greenhouse gases (for instance, carbon dioxide) that can be emitted by the entities covered under the system. Additionally, an important feature of the ETS mechanism is an emission allowance that entitles the holder to emit an agreed volume of greenhouse gases. Emission allowances must be obtained, either from the government or through trade with other entities. In other words, an entity falling short in meeting its compliance targets must either reduce emissions through in-house abatement measures or purchase allowances from the market (Figure 1).

Figure 1 Demonstration of a emissions trading system



Source: Singh and Chaturvedi (2023)

On the other hand, if an entity reduces its emission beyond its compliance level, it can sell surplus allowances in the exchange market. Therefore, an ETS incentivises emission reduction in industries where it is cheapest to do, thereby helping achieve cost-effective reduction of GHG emissions. The carbon price signal from the market drives emission reduction and promotes investment in low-carbon technologies, contributing to the financial and operational decisions within entities. While trading brings flexibility to the system, entities are also allowed to bank their spare or surplus allowances to cover compliance targets in the subsequent years. Also, allowing the use of offsets for meeting targets adds to the system's flexibility. However, only a set proportion (as specified by the regulatory authority) of compliance targets can be met through offsets.

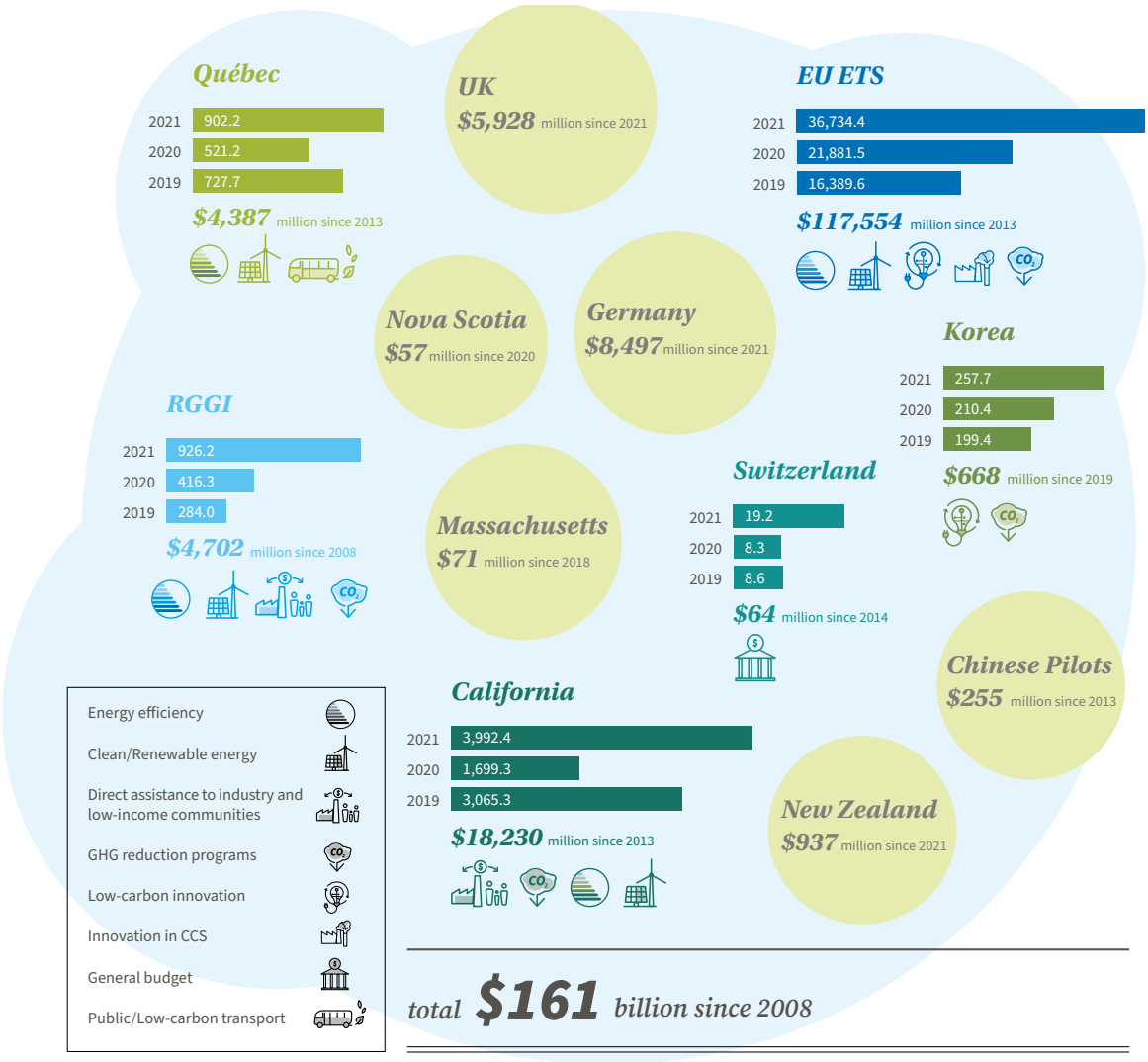
Critical elements for ensuring an effective ETS design

The key pre-requisites for ensuring the effective functioning of an emission trading system are (a) a transparent, robust, consistent and accurate monitoring, reporting, and verification (MRV) system along with strong enforcement, (b) an ambitious cap in line with Paris Agreement goals, (c) efficient data flow and management, for example, electronic reporting and registry, (d) a reliable and efficient market for trading allowances, and (e) long-term policy signals through markets for addressing future uncertainties.

ETS as a means of providing valuable climate finance

An emission trading system has the potential to generate revenue through auctioning of emission allowances, which can be used to finance climate mitigation and adaptation measures and other beneficial measures, including just energy transition and support for vulnerable communities. For instance, revenue generated in the European Union Emissions Trading System (EU ETS) has been used to fund different renewable energy projects, energy efficiency initiatives, hydrogen steelmaking, and carbon capture, utilisation, and storage (CCUS) projects. The amount of revenue can be substantial, depending on the carbon price and the auction share. For example, the EU ETS generated around $59 billion in 2020 and 2021 alone. Another interesting example is the California cap and trade programme, which includes a fund called California Climate Investments, financed through a portion of the revenue generated from the sale of emission allowances. This fund supports a range of measures, including clean energy programmes, transportation projects, and programmes to support vulnerable low-income communities. Figure 2 depicts more such examples.

Figure 2 Generating valuable climate finance through auction revenue across jurisdictions



Source: ICAP (2022)

ETS has the potential to generate revenue through auctioning of emission allowances, which can be used to finance climate mitigation and adaptation measures.

Auctioning is feasible for sectors that can pass-through carbon costs to product prices and are not at risk of carbon leakage. The power sector can be an important sector for auctioning, assuming there is a suitable cost pass-through mechanism to electricity prices. Industrial and residential stakeholders vulnerable to increased energy costs could be protected using a portion of the auction revenue.

Role of ETS in climate policy mix and protecting industrial competitiveness

ETS plays a central role in investment decisions around climate policy as it provides clear price signals, which can, in turn, help to drive investment in low-carbon technologies and encourage more efficient use of energy. Moreover, by putting a price on carbon, ETS can be used to drive reductions across the marginal abatement cost curves (MACC). For instance, if the price in the exchange market is higher than in-house mitigation, companies have an incentive to find ways to reduce their emissions more cost-effectively. For example, a company may invest in energy efficiency measures such as by switching to a lower-emission fuel.

Climate finance from ETS can support investment in emission reduction projects at the extreme ends of marginal abatement cost curves because, in some cases, emission reduction projects may require high upfront investment costs or involve complex technologies. Climate finance from ETS can help to bridge this financing gap.

Additionally, an ETS by design provides assurance of achieving GHG emission targets through a compliance cycle and sanctions. In this system, regulated entities therefore have a clear incentive to reduce their GHG emissions to comply with the cap set, which in turn ensures that overall emissions are reduced to the level needed to achieve the GHG emission targets.

Furthermore, the decision on free allocation under an ETS can be used to protect industrial competitiveness. For instance, a higher share of free allocation can be awarded to sectors at a high risk of carbon leakage. The Korean ETS uses carbon leakage criteria for determining sectors for free allocation and share of free allocation/auctioning in a similar way to the systems in the EU, California, and elsewhere. India could use this approach for protecting the international competitiveness of its emission-intensive industries under the ICM-Compliance market.

Evolution of ETS in East and Southeast Asia

Table 1 summarises the implementation and design of different emission trading systems around East and Southeast Asia. Korea started its ETS in 2015 with an absolute target covering all major sectors of the economy. China started the implementation of ETS with only the power sector in the initial phase and then plans to expand to other sectors of the industry. Indonesia started its mandatory ETS for the coal power sector in 2023. Countries such as Viet Nam, Japan, and Malaysia are also in the process of developing their national emission trading systems.

Table 1 Evolution of ETS in East and Southeast Asia

Country	Start year	Sectors	Emissions ($MtCO_2e/y$)	Cap type	% Auction
Korea	2015	All	~600	Absolute	10% (Phase 3) ↑↑ (Phase 4)
China	2021	Power, then industry	~4,500 initially, then ↑↑	Intensity	To introduce & expand
Indonesia	2023	Coal power, then industry	~360 initially, then ↑↑	Intensity	TBC
Viet Nam	2026	All	TBC	TBC	TBC
japan	2026	All	TBC	TBC	TBC
Others	Malaysia, Thailand, philippines and Taiwan are also considering developing ETS				

Source: Authors' compilation. Please refer to Annexure C

Transition from PAT scheme to ETS in India

Under the direction of the Ministry of Power and the Ministry of Environment, Forest, and Climate Change, the Bureau of Energy Efficiency is working on creating an Indian Carbon Market (ICM), which will function as a means to decrease GHG emissions and steer India towards a low-carbon growth path. This will eventually lead the country to achieve the goal of net zero by 2070. The ICM will include a national ETS for different sectors for which intensity-based targets would be set. ETS is expected to enable additional emission reduction options such as fuel switching and investment in innovative low-carbon technologies along with energy efficiency measures vis-à-vis the Perform, Achieve, and Trade (PAT) scheme.

> *"Perform, Achieve and Trade (PAT) is a regulatory instrument to reduce specific energy consumption in energy-intensive industries, with an associated market-based mechanism to enhance the cost effectiveness through certification of excess energy saving which can be traded"—Bureau of Energy Efficiency, Government of India*

The Indian ETS framework should set the GHG emission targets per unit of production, which will help the country to achieve its overarching NDC along with the provision of introducing and scaling up auctioning wherever feasible.

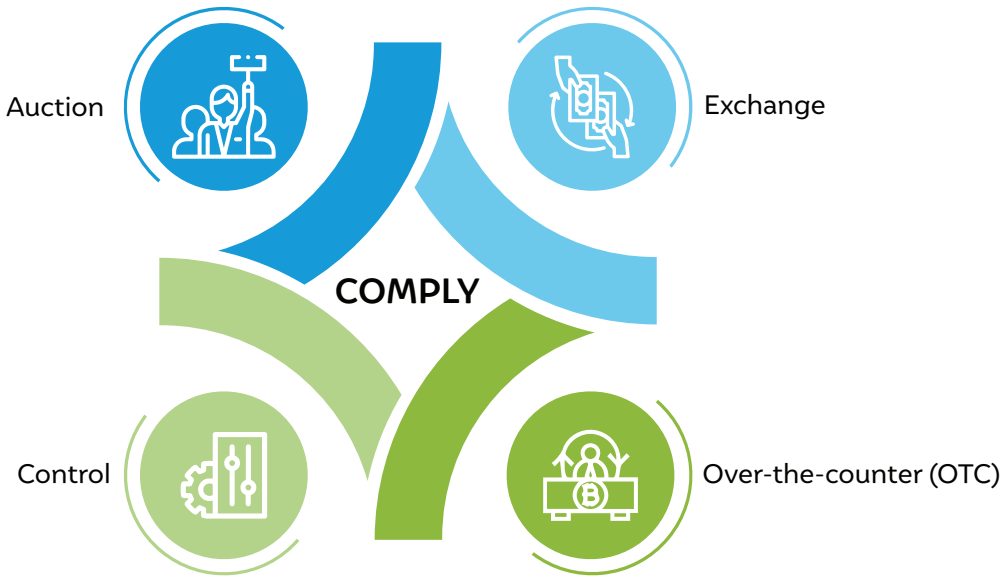
Although policy development (regulations, guidance, and plans), setting building blocks, and capacity building for relevant stakeholders will be needed, the PAT scheme provides a strong platform to establish an effectively functioning emission trading system due to presence of similar building blocks, relevant institutions, energy-saving MRV capability, and large coverage of the scheme.

Key areas to consider for ensuring the effectiveness of an ETS programme for India include target-setting methods, carbon leakage mitigation, power market interaction, auctioning and revenue recycling, market liquidity, and price control.

2.3 The ETS simulation game

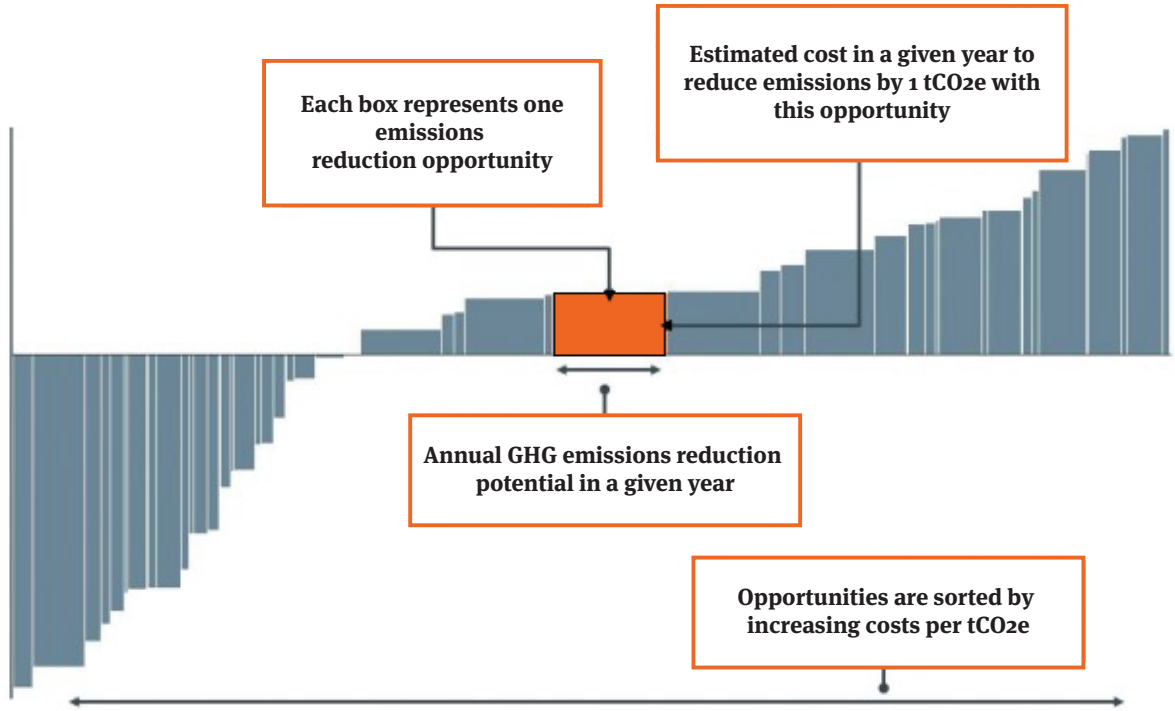
In the CarbonSim game, the participants were provided training on the fundamentals, benefits, and operating principles of an ETS and the basic mechanics of CarbonSim. Prior to the commencement of the exercise, the participants (individuals from the government, enterprises, offset developers, ETS service providers, or civil society stakeholders) joined two- or three-person 'teams.' Each team was assigned to manage a virtual company. Faced with a declining allocation and an increasing amount of 'business-as-usual emissions', the teams had the opportunity to create a carbon portfolio in order to achieve their respective compliance objectives at the least cost possible. Each company had the following levers to comply with the regulation (Figure 3).

Figure 3 Levers that an obligated entity can use in an ETS to comply with the emission target



Source: Authors' compilation

Figure 4 An example of a MAC curve where the x-axis has emission mitigation technologies and the y-axis shows the cost of implementing them.



Source: Climateworks Centre

Control: In the control method, each company analyses available in-house emission reduction technologies with associated costs. For this purpose, a marginal abatement cost curve (MACC) is provided for each entity, inclusive of the upfront capital cost to implement the technology, annual emission reductions expected as the result of the abatement, the projected lifetime of the abatement, the annual net revenue/cost due to implementation of the technology, and the marginal cost of control of the abatement. A team may elect to implement an abatement or, conversely, purchase allowances/offsets if it believes that doing so would be a prudent investment considering all of the above factors along with the team's view of the current and future allowances and the offset market.

Figure 4 depicts an illustrative marginal abatement cost curve for an entity. The technologies listed on far left have negative costs, which means that in the longer term, implementing those technologies will be financially beneficial for the company. As we move from left to right, the cost associated with the implementation of the technologies listed keeps increasing.

It is important to note that financial benefits arising from implementing an emission reduction measure can take time to be realised due to the time required for the measure to become operational. For example, if enhancing energy efficiency is one of the ways to reduce emissions in-house, the cost benefits associated with such a measure can take time to reap financial benefits. Therefore, investing early in in-house abatement is important as it could result in higher benefits for the organisation than delaying the investment. So as to accommodate participant's schedules the CarbonSim game was played for only three years. As such, investing in expensive technologies that take longer time to operationalise did not make sense for the participants. Furthermore, the importance of long-term policy certainty becomes apparent to enable large investments to be economically viable by annualising capital costs over a long time period. This can be achieved by linking the ETS emission targets to a country's NDC and net-zero goal.

Auction: The second lever that a company can use to resolve its compliance shortfall and manage its carbon portfolio is via the primary market through government-sponsored auctions. In the auctioning process, the regulator decides the amount allocated for free and offered via auctions. For example, let us say that the regulator decides that for the power sector, 10 per cent of the allowances will be auctioned and the rest will be provided for free. If an X power company had an allocation of 100 allowances, 90 allowances will be provided for free and 10 allowances can be bought through auctioning, at the exchange or in the over-the-counter (OTC) transaction.

Table 2 Demonstration of the auctioning process

Bids	Price ($)	Quantity (Credits)	Aggregate demand
A	55	30,000	30,000
B	50	25,000	55,000
C	45	30,000	85,000
D	**40**	**15,000**	**100,000 (clearing bid)**
E	35	20,000	120,000

Source: Authors' compilation

The auctioning process works as follows. Let us assume that the regulator decides to auction 100,000 allowances. The regulator will then call for bids from the market participants. The regulator may also decide to put a floor price for the allowances, which means that a bidder cannot bid for a price lower than the floor price. Assume that the floor price set by the regulator is $30. Please see Table 2 for the bidding details.

In the bidding process, starting from the highest bid price, the closing bid is the one where the number of allowances auctioned gets exhausted. In the example above, the successful bids are A, B, C, and D. The price at which each bidder will get allowances will be the clearance price ($40). The company can take part in the auction market considering factors like in-house cost of mitigation, prices available in the exchange market, and OTC transactions.

Trading on exchange: Exchange trading is similar to any other commodity trading. At the exchange market, there are multiple buyers and sellers. The sellers offer a selling price and buyers bid at the price they want to buy allowances at. The inside market consists of the lowest offer and the highest bid. Participants should analyse the ongoing trend in the market and any policy development that may result in an increase or decrease in allowance prices.

Over-the-counter (OTC) transaction: An OTC transaction is done bilaterally between two parties. There is one buyer and one seller involved in the transaction. The transaction is done on the basis of the price and quality of allowances present on the table.

3. Key discussion points from the Q&A session

While the terminology of ETS is used generally, we present a summary of the discussions in the context of the India Carbon Market (ICM) as most of the questions were related to how ICM would evolve and its various associated aspects. Within the ICM, we expect to have an ICM cap-and-trade (ICM-Compliance) market, which is essentially an ETS kind of system, and an offset market (ICM-voluntary) where the Government of India will approve projects and issue carbon credits through its own monitoring, reporting, and verification (MRV) system. This section discusses some interesting and important questions that were raised during discussions across the three simulation workshops.

3.1 What would be the price of carbon in the ICM-Compliance market?

A question that was echoed by many participants was related to the trajectory and level of carbon prices that the ICM-Compliance market could witness. It was clarified that the objective of the ETS simulation exercise was not to forecast prices in the ICM-Compliance market. However, there are some key aspects that would impact the long-term trajectory of carbon prices in the ICM-Compliance market. These are as follows:

- Carbon prices are a function of two variables in an output-based ETS with emissions intensity targets[2]—the level of overall (cross-sectoral) emissions cap and

2 For an ETS with an absolute cap, the level of output of ETS entities will also be a significant factor affecting the balance of supply and demand of allowances and hence the carbon price.

the marginal cost of abatement across participating entities (designated consumers). These two variables would collectively determine the level of demand and supply of credits in the ICM-Compliance market. The more stringent is the overall emissions cap, the higher would be the carbon prices. The lower the cost of abatement across sectors and entities, the lower would be the carbon price.

- The lower-cost abatement opportunities are harnessed first across sectors and get exhausted; therefore, the time path of carbon price is increasing in nature, reflecting that is it more expensive to mitigate the next unit of carbon compared to the last one.
- Technology breakthroughs lead to lowering the cost of abatement and hence lead to decrease in carbon prices.
- If credits from the offset markets (ICM-voluntary market) are allowed in the ICM-Compliance market, this would imply an increase in the supply of credits and hence a downward pressure on carbon price in the ICM-Compliance market and an upward pressure on carbon price in the ICM-voluntary market.
- If the ICM credits, be it from the offset market or the ICM-Compliance market, are allowed to be imported in the EU ETS or any other international carbon market system, it would lead to a higher demand of ICM credits and hence an increase in their prices.

All the points mentioned relate to the long-term price trajectory of carbon, but the short-term dynamics and fluctuations around the trend are impacted by many other factors.

3.2 Should financial players be allowed in the market?

This was one big question that was evident during the discussions across the three cities.

As the ICM market evolves, it is reasonable to expect that multiple types of players may participate in the market:

Liable entities: These are typically companies that are regulated under the ETS, often by virtue of their emissions type (i.e., a GHG such as CO_2, CH_4, SF_6, N_2O, etc.) and volume, that are obligated to measure, monitor, and verify their emissions. Such entities are also afforded the option to use their carbon portfolios to manage their emissions by either reducing emissions (via on-site abatements) and/or surrendering eligible allowances (secured from the government via allocations or through the secondary market) and/or buying offsets (secured from the market) in order to meet ETS-specified absolute or intensity-based goal(s).

- **Financial traders:** Financial traders are sometimes called 'speculators' who manage positions with the intent of making profits, mitigating losses, and managing risks. Like a liable entity, a financial trader is a principal in an allowance or offset transaction. Unlike a liable entity, a financial trader does not have the responsibility to monitor or manage emissions nor to surrender allowances or offsets.
- **Market-makers:** These entities provide market liquidity by posting bids and offers that can be hit and lifted (accepted) by counterparties. Such entities generally are principals in allowance and offset transactions.
- **Brokers**: These players introduce and sometimes facilitate transactions between buyers and sellers. Unlike liable entities, financial players, and market-makers, brokers are agents for trade counterparties (e.g., buyers and sellers) and are generally not principals at risk for transactions. In such cases where brokers clear trades (i.e., provide escrow-like functions where they receive monies from a buyer, allowances/offsets from sellers, and subsequently deliver allowances/offset to buyers and purchase monies to sellers), they may take title to allowances/offsets for only so long as it is necessary to provide such clearing functions.

The roles, responsibilities, and privileges of each of these participants will generally be defined by specified ETS rules and/or the responsible regulatory entity and should be set in accord with considering the overall objectives of the ETS. For instance, California establishes holding limits, which serve to limit the number of allowances that participant players, liable entities, and financial players can hold. Policymakers can also impose restrictions that serve to limit market volatility, arbitrage opportunities, prices, and windfall gains that could otherwise be earned by participants. Moreover, given that the government is risk-averse, it may elect to come in and closely monitor the participation of financial players until such time as it decides that their broader engagement clearly contributes to the realization of underlying ETS goals.

The roles, responsibilities, and privileges of each participants will generally be defined by specified ETS rules and/or the responsible regulatory entity.

CEEW's Aman Malik helping participants navigate through the simulation exercise at the ETS Simulation Workshop on Indian Carbon Market, in Mumbai, 17 February 2023.

One key concern that was highlighted was that financial players can influence the market in ways that could end up being detrimental to the Indian industry as the industry representatives are not experts in aspects like estimating/forecasting future carbon price trajectories. Regulating these players, therefore, would be essential in the long term. However, it should be understood that restricting financial players from the market can reduce liquidity, make it more difficult to manage market risk, and result in unnecessarily high prices. As such, regulators may seek a solution that tightly prescribes the roles, responsibilities, and prohibitions applicable to financial players who may wish to participate in the market.

As noted earlier, financial instruments can also play a significant role in the ICM. For instance, in particular, options (including puts and calls), futures contracts, and 'carbon contracts for difference' (CCfD) can be used to allow participants to secure the rights to allowances and offsets without having the need to secure title to such instruments on a spot basis. When appropriately included in carbon portfolios, such instruments can be used to hedge/manage risk, reduce volatility, moderate prices, and minimise calls on capital.

> **In the medium to long–term, however, emissions caps should evolve to be much tighter.**

3.3 Should the allocation mechanism in the ICM-Compliance market be free allocation or auctioning?

The decision on free allocation or auctioning needs to be guided by the stage at which ICM-Compliance market is and the carbon leakage risk of the covered entities. The knowledge about ICM-Compliance market will be very limited among market participants in the initial phases of the programme. The focus of this stage should be on capacity building with a motive of developing an understanding on basic mechanics of an ICM-Compliance market among the market players. Therefore, emission cap might be comparatively relaxed with free allowance allocation (either through grandfathering or benchmarking methods) provided to the participating entities. Such policy decisions of free allocation to companies will play a key role in shaping the ICM-Compliance market efficacy for India.

In the medium to long term, however, emissions caps should evolve to be much tighter. In place of intensity-based caps, India might also use absolute control caps. Additionally, the government could decide to limit the level of free allocation and gradually move towards an increased level of auctioning of allowances for sectors that can pass through their carbon costs.

Simulation instructor Josh Margolis helping participants navigate through the simulation exercise the ETS Simulation Workshop on Indian Carbon Market, in Delhi, 15 February 2023.

Auctioning of allowances is a more transparent way of allowance allocation than free allocation. It strengthens the carbon price signal (embodying the polluter pays principle) and, as discussed in section 2.2, allowance auctioning can also generate revenue for the Indian government that can then be used towards providing valuable climate finance as well as towards supporting vulnerable communities and just transition.

3.4 Should companies choose in-house mitigation or buy allowances from the carbon market?

Under the ETS, usually, there is a single emissions cap across sectors, while allocation of allowances or targets at the entity-level may be sector- or industry-specific. However, abatement costs are different across sectors as well as across entities within a sector. In the ICM-Compliance market as well, company-level abatement choices (including energy efficiency, fuel switching, and GHG emission reduction technology) would be based on their individual marginal abatement cost curves. For instance, two entities in the same sector facing similar caps might have different MAC curves wherein one might find abatement more cost-effective than trading in the market and vice versa. An ICM-Compliance market system by default will incentivise best-suited strategy at the firm level through clear signals.

> **The share of offsets (from ICM-voluntary market or Article 6) that will be allowed for surrendering against compliance targets under the ICM will entirely be a policy choice.**

If an entity faces a higher cost of mitigation in-house as compared to the price of emission allowances, it could decide not to implement an emission mitigation strategy in-house and instead would be a buyer of carbon allowances. On the other hand, if mitigating in-house is cheaper than the carbon price, the entity would decide to mitigate in-house and can generate significant revenue by selling allowances. An entity's investment decision should ideally be based on the expected future carbon price that would apply to its investment, considering the time to implement the investment and its operating life, which is likely to be greater than the current market price. Entities have the option to delay implementing emission mitigation options in-house if they are very costly to do so and as emission reduction targets get tighter. Therefore, whether an entity decides to mitigate emissions sooner or later is a significant entity-level strategy that needs to be considered.

Key speakers, participants, and facilitators at the ETS Simulation Workshop on Indian Carbon Market, in Mumbai, 17 February 2023.

3.5 Should India implement an emission-intensity-based cap or an absolute emissions cap?

The ICM-Compliance market is expected to be based on emission intensity-based targets in the near future. Emission reduction targets are set based on GHG emissions (tonne of CO2e per tonne of the product). The absolute cap on an entity in this case will therefore be

*Prescribed emission intensity (tCO2e/t of product) * total production (in tonnes)*

This number also is rendered in tonnes of CO2e similar to an absolute emission cap.

While the mature ETSs have absolute emissions caps, there are good reasons for the same pattern not being followed in the ICM-Compliance market in its initial phase. The choice of absolute versus intensity-based cap has to depend on the context of a country. Emissions are heavily determined by the growth in GDP as shown in Chaturvedi (2021). For a fast-growing developing economy like India, it is very challenging to set absolute emissions cap due to uncertainties related to future economic growth forecasts. Once the GDP growth rate starts tapering with increasing per capita income, ICM-Compliance market can start shifting towards an absolute emissions cap, with adequate flexibility potentially including market stability measures and adjustments in allocations in line with actual production. Even jurisdictions that employ an absolute emissions cap can provide flexibility in terms of variability in emissions induced by an increase or decrease in production volume. For example, in EU ETS, if an entity's production increases or decreases by 15 per cent of what was forecasted at the time of setting the emission cap, the allocation level can be adjusted.

3.6 What could be the role of offset markets in the cap-and-trade market debate?

As noted earlier, allowing liable entities to meet their compliance obligations by surrendering either offsets or allowances can provide increased flexibility and cost relief while also encouraging reductions from sources that are outside of the cap. To help achieve underlying ETS objectives, it is possible to narrowly prescribe the methodologies that can be used to create offsets, the geographic areas (both Indian and international) from which they can be secured, measures that must be used to minimise leakage, and the relative proportion that can be used to satisfy compliance obligations.

Liquidity in the market can be moderated by placing a stringent cap, providing policy certainty, and including sectors not covered under the PAT scheme at present in India.

The Indian offset market will comprise the compliance offset market and the voluntary offset market. The compliance offset market will consist of offset market under the government-led ICM (ICM-voluntary) and the UN-driven market under Article 6 of the Paris Agreement. The ICM-voluntary market, in alignment with the ICM-Compliance market, will be used by policymakers to help India achieve its NDC. Under Article 6.2, two jurisdictions can come together under an agreement and bilaterally decide the nature of transactions between them with the aim of cost-efficient emission reduction. The Indian government recently published a list of 13 sectors that can generate credits and be transacted under Article 6.2. Similarly, offset trading can also happen under Article 6.4 and the rules for this trading are being finalised.

The voluntary offset market, on the other hand, is driven *entirely* by private players including project developers, accreditors, verifiers, and corporations seeking to meet their voluntary targets and local communities. The voluntary offset market should work independently of the compliance market.

The share of offsets (from ICM-voluntary market or Article 6) that will be allowed for surrendering against compliance targets under the ICM will entirely be a policy choice. However, offsets are expected to play an important role in accelerating the pace towards net-zero targets at the country level. Therefore, the government's decision on the potential quota of offset usage in ICM-Compliance market will be crucial for market players.

Credits from the ICM-voluntary market will essentially increase the supply of credits in the ICM-Compliance market. How big or small this supply is in absolute sense, and to what extent will it impact the dynamics of carbon price within the ICM-Compliance market, will be determined by the magnitude of offsets allowed in the ICM. A decision to import up to 5 per cent of ICM-voluntary market credits in the ICM-Compliance market would have a much lesser impact on carbon price within the ICM-Compliance market as compared to a higher value of 20 per cent.

3.7 How to ensure equity in CBAM?

To protect their industrial competitiveness against rising carbon prices, the EU has announced the Carbon Border Adjustment Mechanism (CBAM), and similar mechanisms are also being considered by other jurisdictions including the United States. Under CBAM, the EU will levy carbon prices on the import of goods and commodities covered by the EU ETS, so that both EU-produced and -imported goods would effectively be covered by the same carbon price. EU views CBAM as a decarbonisation mechanism. However, an absolute carbon price on every country's export defies the principle of Common but Differentiated Responsibilities (CBDR). Under CBDR, technology and finance should flow from the Global North to the Global South, but CBAM will result in capital flow from the Global South to the Global North. This arena is still evolving to assess its impacts. However, it is clear that the ICM-Compliance market will play a role in reducing the cost impacts of the EU's CBAM for Indian exporting companies by imposing carbon costs on covered entities, as well as enabling cost-effective compliance with India's 2030 NDC and longer-term net zero targets.

3.8 Could micro, small, and medium-sized enterprises (MSMEs) be impacted and how to safeguard them?

Like in the PAT scheme, there is a pre-determined threshold for entities to be able to participate in an ICM-Compliance market. These are usually large installations with significant levels of emissions. Therefore, in all likelihood, MSMEs will not be a part of an ICM-Compliance market and therefore there should be only a minimal direct impact on these entities. The indirect impact, however, needs to be better understood, especially for MSMEs that are a part of the supply chain of sectors that are going to be covered under the ICM-Compliance market.

3.9 What could be the role of policymakers in successful implementation of the ICM?

It will be essential for policymakers to ensure the efficiency and reliability of the market structure. Consequently, strategic choices concerning emission caps, allocation regime, and MRV systems will be

crucial for government stakeholders. MRV for ICM-Compliance market can be built upon the monitoring systems operational under the PAT scheme wherein energy-related information (e.g., fuel mix) is already recorded. Policymakers will also have to provide clear market signals in order for entities to devise long-term decarbonisation strategies.

Indian policymakers also need to ensure efficient preconditions in order to give out a best-suited ICM-Compliance market design aligned with the economy's overall objectives. Cross-country learnings will play a key role, especially while deciding cap stringency, allocation method, role and scope of operation for financial players, and providing a transparent platform for trading of allowances, including over-the-counter (OTC) trades with a motive of minimising inefficiencies. However, replicating the exact ETS parameters as being done across jurisdictions like the EU, California, or Korea might not be the best option for India. India's strategy should balance cross-country learnings, the economy-wide cost-effectiveness objective, and socioeconomic trade-offs. Additionally, liquidity under the ICM-Compliance market will depend on the level of cap in place as it will impact the long/short position of companies, which in turn will determine their demand for credits. A more stringent cap and policy certainty will also influence entities investing in entity-level in-house emission mitigation measures through technological innovations. This will mean that eventually entities may move from being allowance buyers to allowance sellers in the long term, thus impacting both the supply and demand sides. Therefore, through policy design, supply, and demand for credits and therefore liquidity in the market can be moderated by placing a stringent cap, providing policy certainty, and including sectors not covered under the PAT scheme at present in India.

4. Conclusion

Indian stakeholders have an extensive experience in the project-based or offset carbon market. The Indian government plans to implement an ETS in India to be known as the Indian Carbon Market (ICM), which is expected to have a cap-and-trade market (ICM-Compliance market) and an offset market (ICM-voluntary market). There needs to be a significant effort towards building capacity among relevant stakeholders about an ICM-Compliance market and how it functions. Simulation exercises help bridge that gap and improve the understanding of the operational nature of ETS among market actors. The simulation and discussions, organised across three cities in India and attended by 215 participants, helped capture informed concerns and questions about an ETS in general and ICM in particular. As the Indian Carbon Market framework is still under construction, it is important to consider the questions and concerns raised at the simulation workshops.

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Suggested citation: Singh, Nishtha, Vaibhav Chaturvedi, Chetna Arora, Alistair Ritchie, Josh Margolis, Trupti Mishra, Amit Garg and Minal Pathak. 2023. *Demystifying Carbon Emission Trading System Through Simulation Workshops in India.* New Delhi: Council on Energy, Environment and Water, Ahmedabad University, Indian Institute of Management - Ahmedabad, Asia Society Policy Institute.

Disclaimer: The views expressed in this work are those of the authors and do not necessarily reflect the views and policies of the Council on Energy, Environment and Water.

Publication Team: Kartikeya Jain (CEEW); Alina Sen (CEEW); The Clean Copy; MADRE Designs; and FRIENDS Digital Colour Solutions.

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