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Linking Carbon Markets: A case study of India's PAT and REC Schemes

Following the enactment of the Paris Agreement, the carbon markets in national and international spheres are poised for revival. Although the global carbon market dependent on the Kyoto Protocol have nearly collapsed, many voluntary or national carbon markets are still functioning in several countries under relevant regulations or voluntary arrangements. These include markets and trading systems such as ETS in EU, and Renewable Energy Certificates (REC) and Perform Achieve and Trade (PAT) in India.

There are also several innovative mechanisms being developed and piloted, along with capacity development at the ground level, across the globe. Currently, an estimated 15% of emissions are covered under the 13 existing emission trading systems across the world,¹ and a significant additional amount are covered under the various market based mechanisms which are being implemented.

One of the key questions emerging from the Paris Agreement is how such existing markets are to be integrated with the cooperative mechanisms to be evolved under Article 6 of the Agreement. With a view to make progress towards an efficient and effective international carbon market, there is a need to develop methods for building fungibility for the different carbon markets. Hence, testing the technical and institutional parameters for linking carbon markets is essential in order to fully understand the opportunities and challenges in evolving a future global carbon market as also in implementing such schemes at the national level.

In this paper, it is proposed to discuss the broad framework of and requirements for linking two distinct carbon markets. The case of two Indian market-based mechanisms (MBM) - PAT and REC schemes will be taken to analyse and discuss the issues involved in integrating such markets for the purpose of Article 6 arrangements. Political considerations and requirements for linking these two systems, are out of the scope of this paper, although they are vital to the successful functioning of any form of linked markets and systems.

¹ <https://icapcarbonaction.com/en/ets-map>

Benefits of linking different carbon pricing systems

Linking of carbon pricing mechanisms or markets, creates a more manageable corridor of operation of carbon prices in all participating systems, and makes the cheapest mitigation options available to all participants in the linked system. The larger carbon market created by linking two systems would bring in greater price efficiency, increase the liquidity of carbon assets and thus lay the foundations for discovery of a more stable and correct price of carbon. It will also have the advantage of improving the resilience of the system.

The lessons of linking such markets at the national level will be useful for making assessment of the issues involved in linking two or more national markets at the global level under the Paris Agreement. The methodology adopted for estimating the emissions reduction, eligibility of parties for trading, value of such reductions relative to the cost and demand, and the mechanism for trading amongst partners will be relevant issues to be addressed in this connection.

A combination of market based policy instruments will also be a cost effective way to help India achieve its NDCs. It would have the added advantages of enhancing capacity development, spurring technological and process improvements, strengthening and streamlining the accounting and verification procedures, and in all, reducing transaction costs.

Challenges of linking different carbon pricing systems

The bottom-up approach adopted under the Paris Agreement, gives each party broad leeway in designing their own systems with tailored regulatory frameworks, jurisdictions, eligibility criteria, MRV requirements and metrics. Due to the heterogeneous approaches and the wide range of climate actions covered under the different carbon pricing systems, the carbon assets generated from different climate mitigation efforts have different climate change mitigation values and prices.

Besides the different mitigation value of the carbon assets, there is also the issue of differences in economic systems and market designs. The regulatory fragmentation across the respective jurisdictions adds another layer of complexity and gives rise to governance issues.

Post 2020, a complex network of international and domestic mechanisms is envisaged which may pose challenges such as double counting and lack of environmental integrity, while also opening up opportunities of inter-linking for cost effective mitigation outcomes. It is also important to consider the impact of linking two systems, either at a national and sub-national level, or at bilateral and multilateral levels, on the country's Nationally Determined Contributions (NDC).

The key challenges in linking two carbon markets are the following:

- How to link the different measurements, in terms of price and quantities attached to a certificate or unit, to a common metric?
- How to establish a link or equivalence between the processes of distinct markets – through methodologies or outcomes?
- How to ascertain and establish the price at which the interlinked markets will trade or convert their emission units?
- How to incentivize or bring in additional 'value-added' to the new system, in terms of benefits to the linked markets and enhanced emissions reduction?
- Whether an integrated institutional mechanism will be needed for registry or governance in terms of certification and approvals for units in interlinked markets? If yes, how will such a system be established?

It is also important to understand the role that Government can play in facilitating this, in terms of policies, regulations or recommendations.

Methods for Linking Markets

Linking between two carbon markets or MBMs for putting a price on carbon, can be done under two broad approaches - either directly or indirectly, with both leading to a greater degree of price convergence and resultant efficiency gains.

- Direct linkage: Under this form of linkage, the carbon assets from one system can be used in another, directly. This could be a bilateral/multilateral linkage with all participating systems being able to trade in any of the linked systems, or it could be unilateral (or limited in scope) with only one/some of the participating systems being able to trade or buy or

sell from the other.

- Indirect linkage: Under this form, an agreed established methodology or process can be leveraged to bring the carbon assets from different assets to a common value and then enable their trading. For example, the CDM standards could be used.
- Networking: In this, instead of seeking to align two or more types of mitigation actions, which would require change in methodologies, processes and probably even regulation, and may require any additional institution, it seeks to facilitate the trade of outcomes. This method would recognise the differences of the mitigation actions and the resultant outcomes and evaluate these differences to reach a kind of ‘conversion factor’ between the different mitigation actions.

The methods for linking could largely remain the same, with changes in scale and complexity increasing as more markets, especially internationally – bilateral and multilateral – are added.

Case Analysis of Linking the PAT and REC Markets

India currently has two carbon market-based trading schemes in place- the Perform, Achieve & Trade (PAT) which aims at promoting energy efficiency and the

Renewable Energy Certificate (REC) which aims at promoting clean energy.

PAT is designed to accelerate implementation of cost-effective measures in energy efficiency in large energy-intensive industries. The key goal of PAT is to mandate specific energy efficiency improvements for the most energy intensive industries. The scheme builds on the large variation in energy intensities of different units in the various notified sectors, ranging from among the best in the world to some of the most inefficient units. The energy intensity reduction target, mandated for each unit, depends on its current efficiency; with more efficient units having a lower reduction target and vice-versa.

REC is designed to promote generation of renewable energy (RE) within the country for greening the power grid. The mechanism essentially encourages the large scale deployment of RE and facilitates inter-state exchange of RE power. It enables compliance of the mandated Renewable Purchase Obligations (RPOs) and provides a potential financing mechanism for promoting RE.

Both the MBMs have a high potential of achieving GHG emission reduction and are vital for helping India meet its mitigation goals - while PAT focuses on the most energy-intensive industries, REC focuses on the power sector which is the leading producer of GHG emissions.

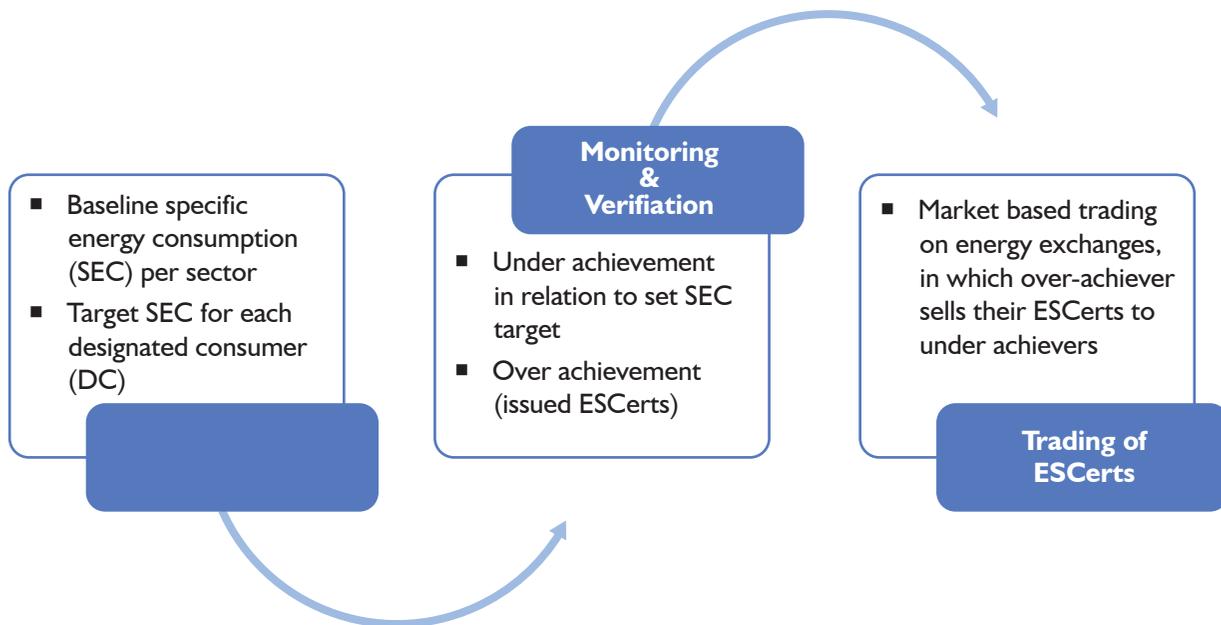


Figure 1: Overview of the PAT mechanism

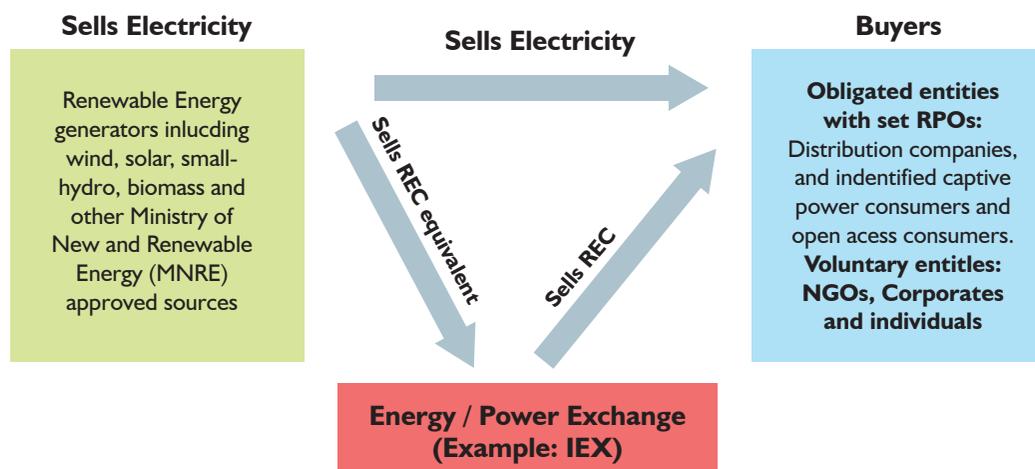


Figure 2: Overview of the REC mechanism

Source: IEX; ESCert Market Update; January 2018

The table below lists the similarities and differences between the two schemes on select key parameters:

Parameter	PAT	REC
Nodal Body	Bureau of Energy Efficiency (BEE), under the aegis of the Ministry of Power (MOP)	Ministry of New and Renewable Energy (MNRE)
Timeframe	Launched in 2012; Currently in its 3rd Cycle, with each cycle being for 3 years.	Launched in 2010; no definite cycles designed, but implementation is designed for annual cycles based on notification of RPOs.
Metric	Energy Saving Certificates (ESCert) are measured in ton of oil equivalent (TOE) value; 1 ESCert = 1 TOE saved	REC Certificates are measured in MWh value; 1 REC = 1 MWh
Coverage	Till date, 11 energy-intensive sectors have been notified for PAT - Aluminium, Cement, Chlor- Alkali, Fertilizer, Iron & Steel, Paper & Pulp, Thermal Power Plants, Textile, Railways, Refineries and Electricity Distribution Companies.	2 categories of RECs: solar RECs and non-solar RECs. The following categories are included: Electricity distributors/ suppliers such as Distribution Licensees, Captive Consumers, Open Access users
Participants	Currently there are 737 participants (known as designated consumers) from 11 notified energy-intensive sectors.	In the March 2018 there were over 1000 participants in the non-solar category (trading in solar has been stopped since April 2017, however the participants then were over 500)
Regulatory Body	Central Electricity Regulatory Commission (CERC)	Central Electricity Regulatory Commission (CERC)
Registry	Power System Operation Corporation Limited (POSOCO)	Power System Operation Corporation Limited (POSOCO)
Trading Platform	Indian Energy Exchange (IEX) and Power Exchange India Limited (PXIL)	Indian Energy Exchange (IEX) and Power Exchange India Limited (PXIL)
Mitigation Impact	In its three cycles, ending in FY 2019-20, PAT aims to achieve overall energy saving of over 16 MTOE (implies over 50 million tonnes of carbon dioxide emission, annually).	Target of achieving 15% of India's electricity from renewable energy sources by 2020 (implies over 25 million tonnes of carbon dioxide emission, annually).

Comparison on Regulatory and Institutional Parameters

As seen from the table, PAT and REC are very similar on the institutional parameters, i.e.: regulatory body, registry and trading platforms. This could make the possible linking of these two schemes easier on this, usually challenging, aspect. Further, both are Government mandated schemes falling under the responsible nodal ministries, with a fair amount of implementation experience.

A key difference between the two mechanisms is the different approaches taken to determine the targets. While under PAT, efficiency targets are based on benchmarking of a range of actors in each sector, in REC the approach taken is more akin to grandfathering, with the RPOs being fixed on the basis of national goals and interests and allocated across the various states.

Further, in PAT the price is discovered competitively, based on ‘buy-sell dynamics’, with no support measures. Whereas in REC there is a price ceiling and price floor which is determined for a period and communicated clearly. For the most recent period, starting from April 2017 onwards, the floor price was set at INR 1000 for an REC certificate (for solar and non-solar) and the ceiling or forbearance price was set at INR 3000 for non-solar RECs and INR 2400 for solar RECs².

Comparison on Design Parameters

The two mechanisms are deliberately designed such that they cannot be used interchangeably, to avoid the risk of double counting.

Although the coverage of the two schemes, in term of participants, differs, this in fact indicates that the two schemes could be complementary to each other, with minimal overlaps (electricity distribution companies). So linking the two could naturally expand the carbon market, with the initial actors already having the capacity to participate wholly due to their experience with PAT and REC.

Also, both the schemes price their certificates on the pooled current price of sources of electricity as well as input fuel. This provides relative pricing complementarities between the two schemes due to similarity in methods.

The key difference is in terms of the metric or unit of measurement, and it seems possible to resolve this

and bring them to a common metric of CO2 emission reduction, through the commonly used conversion equations.

Market Trends from PAT and REC Trading

An analysis of the trading data for both PAT and REC on IEX, gives a clearer picture of the scale and price trends.

Over 17 trading sessions, which took place for PAT cycle I from September 2017 to January 2018, the price variation for an ESCert ranged from INR 200 to INR 1200. According to Bureau of Energy Efficiency (BEE), in PAT Cycle I there were 318 sellers and 110 buyers, with nearly 1.3 million ESCerts being traded.

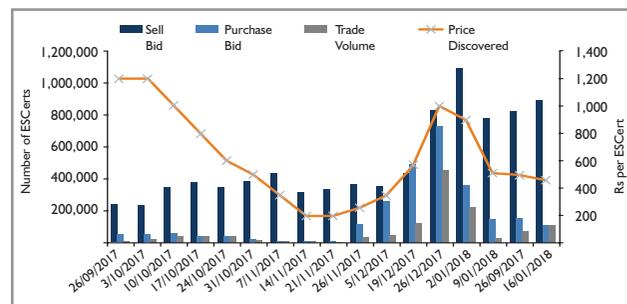


Figure 3: PAT Cycle I - Trading data from IEX

Source: IEX; ESCert Market Update; January 2018

Over the last year of regular trading for non-solar RECs³, the average price discovered for a certificate was around INR 1500 for non-solar. Over 9 million RECs were cleared in the April 1st, 2017 to March 31st 2018 (FY 2017-18) period, with nearly 23 million RECs being cleared since the start of this market in 2010. Currently, there are over 2700 obligated entities and nearly 750 eligible sellers registered on the IEX.

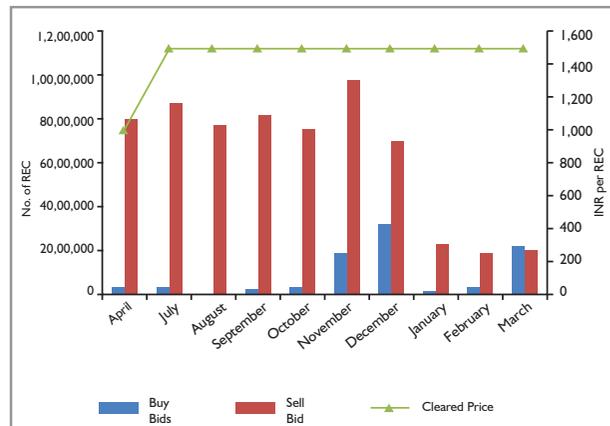


Figure 3: Non-solar REC - Trading data from IEX (FY 2017-18)

Note: REC trading did not take place in May and June 2017
Source: IEX; REC Update; April 2018

² <https://www.recregistryindia.nic.in/index.php/general/publics/faqs>

³ Note: Trading for solar REC's is temporarily suspended

Key Challenges: As can be seen in Figures 3 and 4, the key challenge in establishing a strong and stable market under both mechanisms is the huge gap between the demand and supply of the ESCerts and RECs (carbon assets), with sellers being much more than the buyers. The price uncertainties arising from such instability are also a constraint on effective functioning of the markets. It is necessary to understand if linking the two markets would help in bringing the two markets to a more rational equilibrium or if it would worsen the existing situation.

Approach for Linking PAT and REC

In view of the commonalities and differences between the two mechanisms, and the experiences gained from operation of two market mechanisms, two possible approaches of determining a carbon value under linked markets can be suggested so as to ensure transparency and fungibility between the two markets.

First approach: The first is to convert assets from both to a common metric of price per ton of carbon. This can be done by conducting a comparative grid electricity data analysis, under which the certificates issued under PAT and REC can be converted to their electricity value. This assumes that all actions covered are for energy which is connected to the national grid and so the National CEA determined grid emission factor will be used. In this, PAT certificates, which are in MTOE, could be converted to equivalent MWh value using a determined conversion factor. This will bring both types of certificates, those issued under PAT and those under REC, to a common metric, which can then be used to estimate the emission reduction potential of each type of certificate by applying the grid emission factor (0.82 at present).

This method has the advantage of being amenable to construction of the common metric with the help of existing information and data gathered under the two systems. However, it also has apparent weaknesses as it is largely estimates-based and generalizes the values to compare two very disparate actions on a common metric and so overlooks the longer-term impact and related development co-benefits of the individual programs. The approach would require a strong periodic MRV to verify the parameters used and maintain transparency.

Second approach: Second method involves conducting a disaggregated and granular level input fuel data analysis. Under this, emission factor for

each fuel type will be taken to determine the carbon emission reduction at the project level under both the mechanisms. The PAT scheme already does this to a large extent when it develops baselines and benchmarks for various sectors. While this method would be more accurate in estimating emission reductions, it could prove to be very time-consuming and cumbersome to be done at a large scale.

Third approach: Still another approach could be taken where a comprehensive assessment of the programs to be linked could be made in order to understand their overall value to an economy. This is also known as the co-benefits approach. Mitigation actions bring additional social, environmental, economic and development benefits, which are beyond direct greenhouse-gas mitigation itself and these are known as the 'co-benefits'. These are increasingly becoming an important factor for decision-making on financing and implementing carbon mitigation actions. Valuation methods should be used to uncover the broader sustainable development benefits of mitigation actions. Evaluating the co-benefits of climate actions and assigning an economic value to these can be a potent tool to justify and promote mitigation actions to a wider set of economic actors. However, this could turn out to be a complex, time-consuming and subjective method as there is no standard tool box or methodology for estimating the co benefits of mitigation actions.

Next steps

Ensuring adequate demand and supply of certificates: Considering the difficulties currently being faced in the PAT and REC markets on account of instability in demand and supply, it is essential to do an analysis of the projections of demand and supply of tradable certificates from a linked market before linking the two markets is attempted. This should be accompanied with an assessment of the impact on emission reduction from a linked market viz. two separate markets. Only if the rationale for linking the two markets, on the basis of these assessments is strong, should we design a process and methodology for linking PAT and REC mechanisms.⁴

⁴ Note: A possible option for spurring demand for these certificates is to create a common certificate out of the linked system between the two markets, with MRV processes which are in line with international standards, and either warehouse these for now or trade these outside of the two systems, possibly internationally. A pilot study of such a system would be useful in informing the process of most effectively linking the two markets.

Stakeholder engagement: As a vital next step, an informed discussion between the two nodal bodies – BEE and MoP for PAT and MNRE for REC – is needed, to understand their points of view regarding the pros and cons of converting to a common metric, with a view to fully understand the barriers to and challenges in linking the two systems. It would also be imperative to include the Ministry of Finance in these discussions at this initial stage, so as to get their inputs on how best to securitize and create carbon assets which are valuable in international carbon markets; and also the Ministry of Environment, Forests and Climate Change to understand the impact of such a linkage on India's achievement of its climate contributions.

While designing a system for possible linking of PAT and REC or forming a national-level carbon market, it is critical to start by effectively engaging all key stakeholders and seeking their inputs to inform the design process. The stakeholder engagement process should also include a level of awareness and capacity building, which can be enhanced at regular periods. This will help in encouraging higher participation in the market, which should enhance the demand and supply side and thus help in creating a more stable market.

Common trading registry: As India starts strengthening its climate actions and takes steps towards carbon pricing, it is likely to require a system for measuring the impact and robustness of its efforts. An important building block for keeping track of emissions and avoiding double counting across various MBMs is the emissions trading registry. India has recognized this issue and has already started working on developing such a registry. The two existing markets have a registry mechanism of their own. This can be further strengthened by developing a national Meta-registry, which was a proposed component under India's Market Readiness Proposal (MRP)⁵. The Meta-registry is envisaged to synthesize all the relevant information from the existing registries of individual MBMs (such as PAT and REC) and possibly develop mechanisms to facilitate inter-linking of MBMs. The registry is also envisioned to link domestic MBMs and the National Inventory Management System in order to provide a supporting framework for the design, piloting, and scaling-up of MBMs. It will generate bottom-up data from these MBMs and so strengthen the

MRV and transparency processes. This will also facilitate consistency in available data for accurate reporting for greater transparency and lead to better linkages across two or more systems.

Tools for Evaluating Different Carbon Assets

As introduced above, under the Paris Agreement the MBMs and other initiatives of putting a price on carbon are expected to be developed through a bottom-up approach. These are likely to be diverse in nature, with varying scale of jurisdiction, timeframes and sectoral coverage. Some are mandated under Government policies, while others are voluntary in nature. There are no common global governance factors for these, making it challenging to link different MBMs or initiatives.

Monitoring, reporting and verification standards to ensure that 'a ton is a ton' are a key prerequisite for a common market. Thus it's vital to ensure a level of compatibility or create a framework for facilitating a common assessment of different systems and mechanisms. To link these markets, it is essential to first get all the required information on the mechanisms and compare them on common criteria. To do this, the World Bank is developing a Mitigation Action Assessment Protocol tool (MAAP). Currently, this tool compares different programs on four broad parameters to assess the overall mitigation value. These parameters are: *design of the mitigation action*, which includes scope, targets, roles and responsibilities, emission reduction, monitoring and reporting, among others; *assessing the management entity* on their framework, financial capacity and capability to manage climate change programs; *financial planning* to assess the *robustness of the funding sources*, investments and revenue streams; and *co-development benefits* to understand the impact of the mitigation action on sustainable development criteria.

The objective of the tool is to compare different assets on the basis of their mitigation value, provide a level of confidence to investors by assuring the emissions integrity and assessing their long-term viability and risk profile. MAAP is trying to establish a broad framework to enable exchange of carbon assets by benchmarking these against certain standards which are set by other mitigation actions. It uses a simple and user-friendly approach which allows the user to weigh the different risk categories in accordance with their requirements and then assess them on the basis of the criteria definitions.

⁵ The MRP was submitted to the Partnership for Market Readiness, and approved in March 2017, with the implementation phase starting soon.

This gives the tool a degree of flexibility and broad applicability, while the wide-range of criteria covered under each category makes the assessments robust and comprehensive. There is a need for developing more such frameworks and tools, to enable comprehensive assessments of mitigation actions and the quality of the assets generated from these.

Recommendations for going forward

Piloting market linkage approaches: To accelerate exchanges across different systems and move towards effective modalities for developing a common market at the national or international level, it is necessary to test the technical and regulatory foundations for establishing market connections. Partnerships and piloting different levels of market linkages through innovative approaches including agreed common metrics would be the driving force to enable these. Development organisations including multilateral and bilateral institutions could play a vital role to facilitate and enable this.

Platform for sharing best practices and assessments: To prompt domestic decision-making and allow Governments to take decisions which are in the best interest of their domestic situation, information and experience sharing of market linkage process from across the world are an important motivating factor. This requires a common platform for warehousing case studies and analysing the best practices and also failures under the UNFCCC. A platform like this would also help in broadening the thinking on creating carbon assets and facilitate the expansion of common mitigation actions to a wider range of sectors and also widening the range of climate actions which are permissible and recognized. Further, lessons learnt at the national level in linking

such markets will be useful in evolving an interlinked global carbon market under Article 6 arrangements of the Paris Agreement.

Leveraging pricing 'safety valves': To provide confidence to potential participants in emerging carbon markets, the role of safety valves in the form of price ceilings and price floors, are mechanisms which should be further explored and leveraged. These would incentivize broader participation and also play a role in stabilizing nascent markets.

Creating an iterative and flexible approach: To encourage innovation in approaches to link different carbon pricing systems, it is important to ensure that the process for linking different systems should, in the initial stages, be iterative in its approach, with the flexibility to make necessary changes at set intervals.

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