CTTN Research Grants Program 2024

Exploring Opportunities for Linking Emissions Trading Systems among CAREC Countries

Giorgi Khishtovani
Nana Kajaia
Gugula Tsukhishvili

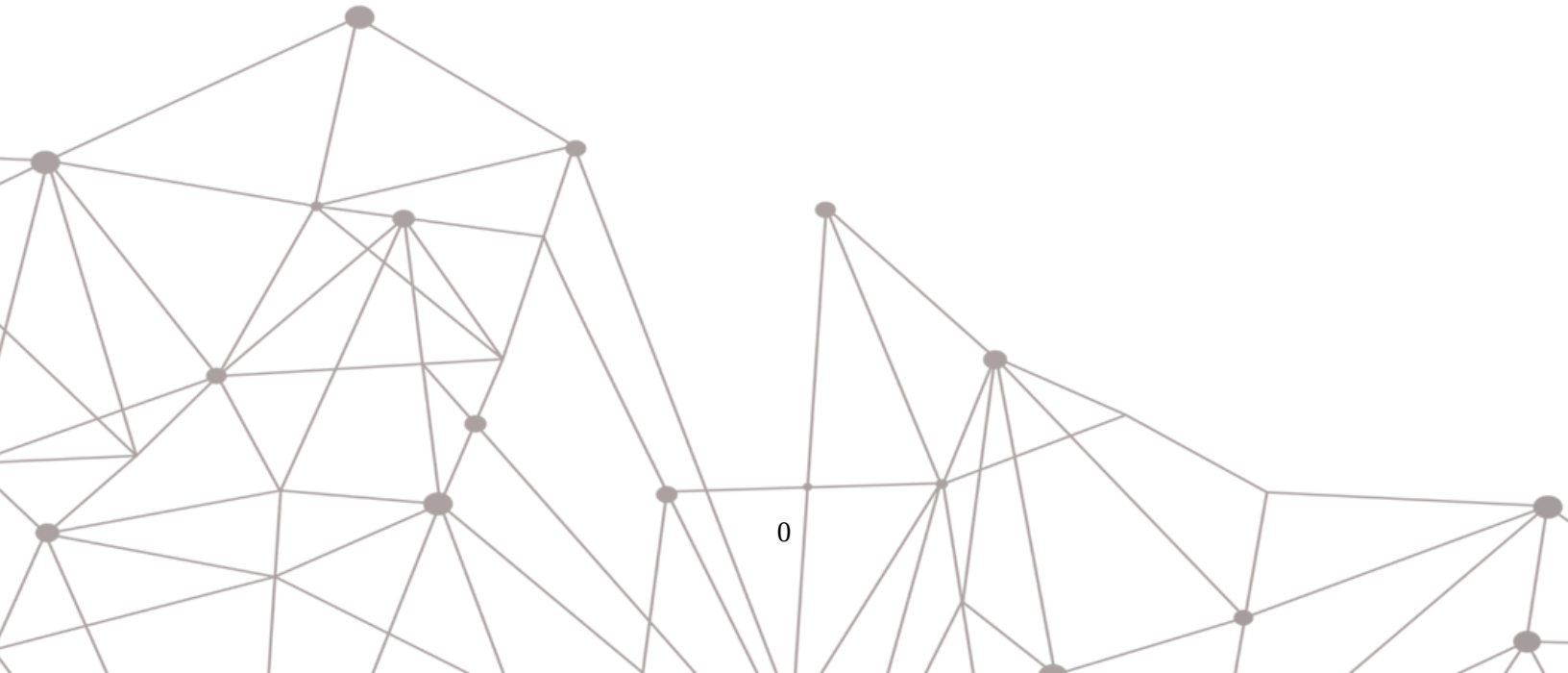
Exploring Opportunities for Linking Emissions Trading Systems among CAREC Countries

Authors:

Giorgi Khishtovani

Nana Kajaia

Gugula Tsukhishvili



Disclaimer:

The views expressed in this publication are the views of the authors and do not necessarily reflect the views or policies of the CAREC Institute, its funding entities, or its Governing Council. The CAREC Institute does not guarantee accuracy of the data included in this publication and accepts no responsibility for any consequences of its use. The terminology used may not necessarily be consistent with the CAREC Institute's official terms. The CAREC Institute accepts no liability or responsibility for any party's use of this publication or for the consequences of any party's reliance on the information or data provided herein.

By making any designation of or reference to a particular territory or geographical area, or by using country names in the report, the authors did not intend to make any judgment as to the legal or other status of any territory or area. Boundaries, colors, denominations, or any other information shown on maps do not imply any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

Central Asia Regional Economic Cooperation (CAREC) Institute

20th-21st Floors, Commercial Building Block 8, Vanke Metropolitan,

No. 66 Longteng Road, Shuimogou District, Urumqi, Xinjiang, the PRC, 830092

F: +86-991-8891151

LinkedIn: carec-institute

km@carecinstitute.org

www.carecinstitute.org

Table of Contents

Abbreviations

Abbreviation	Definition
ADB	Asian Development Bank
CAREC	Central Asian Regional Economic Cooperation
CETS	China Emissions Trading System
EDF	Environmental Defense Fund
ETS	Emissions Trading System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ICAP	International Carbon Action Partnership
ICWC	Interstate Commission for Water Coordination
IETA	International Emissions Trading Association
IFAS	International Fund for Saving the Aral Sea
IGES	Institute for Global Environmental Strategies
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contributions
MAC	Marginal Abatement Cost
MRV	Monitoring, Reporting, and Verification
NDC	Nationally Determined Contributions
PMI	Partnership for Market Implementation
RGGI	Regional Greenhouse Gas Initiative
ROA	Return on Assets
RTA	Regional Trade Agreement
UNDP	United Nations Development Programme
UNEPCCC	United Nations Environment Programme - Copenhagen Climate Centre
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WCI	Western Climate Initiative
WTO	World Trade Organization

Executive Summary

Climate change presents significant challenges to Central Asia, owing to the region's heavy reliance on fossil fuels and vulnerability to environmental disruptions. Although Central Asian countries have set decarbonization targets and adopted green economy strategies, a more coordinated approach is required to address climate change effectively. Linking Emissions Trading Systems (ETS) has emerged as a promising mechanism with potential economic and environmental benefits, including lower aggregate emissions, reduced compliance costs, improved market liquidity, and enhanced political durability for climate policies.

This study investigates the applicability and implications of linking ETSs in the Central Asian Regional Economic Cooperation (CAREC) region, addressing both opportunities and challenges identified by mapping current ETS landscapes and drawing insights from international experiences to inform policy recommendations for enhancing regional climate cooperation.

Currently, within the CAREC region, only China and Kazakhstan have implemented ETSs at the national level, with Kazakhstan implementing a national ETS in 2013 and China transitioning from subnational pilots to a comprehensive national ETS in 2021. The different approaches to ETSs in these two countries reflect diverse strategies and priorities, which are pivotal for discussions on linking regional ETSs. Kazakhstan's ETS covers more sectors and uses free allocation based on benchmarks, whereas China's ETS combines various allocation methods and limits offsets. These differences create opportunities to develop linked ETS systems, allowing countries with economic conditions and climate goals similar to those of Kazakhstan to connect with Kazakhstan's system, and those aligned with China's strategies to link with China's system.

Notably, international experiences, such as the European Union (EU) ETS, demonstrate that harmonizing ETS designs and governance frameworks facilitates successful linkages. Technical infrastructure, monitoring, reporting, and verification systems, and capacity-building are essential for effective implementation and regulatory alignment. Additionally, analysis of national-level ETSs in Central Asia (China, Kazakhstan, and the ETS initiative in Pakistan) and international regional cooperation, such as the EU ETS and Regional Greenhouse Gas Initiative (RGGI), highlights that challenges such as infrastructure development, regulatory alignment, economic fluctuations, and public acceptance must be addressed to successfully establish linked ETSs in the CAREC region.

This study identifies four key enabling factors for establishing a linked ETS: environmental ambition, economic composition, economic and political cooperation, and geographical proximity. The analysis indicates that, overall, CAREC member states perform well in these areas, creating a favorable environment for potential linkages. However, challenges persist that hinder the introduction of ETSs in the region, including a lack of institutional capacity and economic and political constraints.

Strategic policy recommendations have been formulated in response to the current challenges and risks of ETS linking and to capitalize on available opportunities. These recommendations propose strategic pathways for enhancing regional cooperation on ETSs in Central Asia through the CAREC platform. This includes leveraging existing networks to facilitate dialogue among member countries and ensuring participation from government officials, industry representatives, and environmental organizations. By sharing ETS practices and conducting quantitative modeling to identify suitable partners, countries can effectively align their environmental goals and economic frameworks.

Developing national ETS frameworks harmonized with existing ETSs, adopting a phased approach to linkage, and prioritizing technical capacity-building and public awareness are critical steps to ensure

successful ETS linkage in the CAREC region. Additionally, international support from climate funds and organizations is essential for overcoming technical challenges, building institutional capacity, and securing funding for ETS development.

In conclusion, leveraging existing opportunities and systematically addressing challenges can enable CAREC countries to advance sustainable climate action through linked ETSs, contributing to regional cooperation on climate change mitigation.

Introduction and Rationale

The consequences of climate change are becoming increasingly evident, as demonstrated by extreme weather events, rising sea levels, and disrupted ecosystems worldwide. Economic losses totaling an estimated 12.5 billion USD were attributed to climate-related disasters from 2010 to 2019, which is twice the average loss per decade recorded from 1970 to 2009 (Douris & Kim, 2021).

A combination of factors such as heavy reliance on fossil fuels for energy-intensive economies, water scarcity, agricultural dependency, and fragile ecosystems increases Central Asia's sensitivity to climate-related disruptions, making the region particularly vulnerable to the effects of climate change. Regional dependence on fossil fuels has contributed to various environmental changes. For example, as a result of the changing climate conditions, a 30% decrease in glacier surface area was recorded in Central Asia (ADB, 2022). Climate change poses a major threat to the growth, prosperity, and macro-financial and sociopolitical stability of the area with disproportionate economic effects on vulnerable groups, aggravating poverty and inequality and contributing to social tensions, conflict, and migration (Duenwald et al., 2022).

Therefore, to ensure cooperative regional development, member countries of the Central Asian Regional Economic Cooperation (CAREC) must work to actively mitigate climate risks. Signs of positive action are already evident, as all CAREC member countries have submitted Nationally Determined Contributions (NDCs) to the United Nations Framework Convention on Climate Change (UNFCCC) (UNFCCC, 2024) outlining their commitment to reduce greenhouse gas (GHG) emissions.[1] Although certain Central Asian countries have set decarbonization targets and adopted green economic strategies to reduce GHG emissions, a large-scale transition to clean energy is unlikely in the short term. To effectively address climate change, these countries require a more coordinated approach involving closer collaboration and better joint management of natural resources (Sabyrbekov et al., 2023).

Emissions Trading Systems (ETS)[2] are internationally considered to be an important mechanism for mitigating climate risks by effectively reducing GHG emissions and promoting a green economy (Chai et al., 2022). Analyzing variations in ETS implementation across 100 countries worldwide from 2000 to 2020 reveals a 12.1% reduction in GHG emissions and significant shifts toward decreased coal use (by 23.70%) and increased renewable energy utilization (by 61.59%) on average after the launch of an ETS (Bai & Ru, 2022). Furthermore, a recent International Monetary Fund (IMF) analysis showed that emissions trading schemes can effectively impact green investment flows, boost green innovation, and help spread low-carbon technologies across borders (Hasna et al., 2023).

Currently, CAREC countries are increasingly exploring the possibility of ETS adoption to meet their environmental goals; however, this is not uniform throughout the region. To date, only two countries have implemented ETSs. Kazakhstan initiated its ETS in 2013, and China implemented a nationwide ETS in

[1] For GHG emissions data of CAREC member states and their contributions to the region's total emissions, refer to Annex 1.

[2] In an emissions trading scheme, regulators set caps on GHG emissions for specific sectors. Entities receive or purchase emission allowances. By the end of the compliance period, each entity must surrender allowances equal to their emissions. Entities emitting less than their allowances can sell the surplus, incentivizing those with lower abatement costs to reduce emissions. Those with higher costs can buy additional allowances from the market, providing flexibility in meeting regulatory requirements.

2021 (International Carbon Action Partnership, 2024c). Furthermore, Pakistan is currently the only country in the region in the process of developing market-based climate policy instruments. Other countries in the region have not yet considered this mechanism against climate change mitigation. This is likely influenced by the high costs associated with implementing and maintaining an independent ETS, which poses a significant challenge for developing economies within CAREC.

ETS linking is a potential solution to address these economic concerns. Linking occurs when two or more ETSs are interconnected such that participants in one system can use compliance instruments (i.e., allowances) issued by the administrators of any linked system to meet their regulatory obligations (Evans & Kansy, 2021). In practice, the two main types of links are unilateral and bilateral[3]. Unilateral links imply that one ETS accepts the allowances issued by another ETS, but not vice versa. In contrast, bilateral links allow for a two-way flow of allowances, in which participants in any linked system can use the allowances issued by other systems.

Regardless of the type, linking provides both economic and environmental benefits. It reduces aggregate compliance costs and increases efficiency by allowing participants to find the most cost-effective ways to reduce emissions across linked systems. This dynamic is similar to the gains from trade between nations with different cost structures (Evans & Kansy, 2021). Additionally, the larger participant pool created by ETS linking increases market liquidity. Greater liquidity reduces the potential for large transactions to significantly affect prices (Haites, 2014).

Furthermore, ETS linking [4] goes beyond economic gains by promoting regional cooperation and strengthening climate commitments. It represents an important measure that brings countries together to commit to their environmental targets and provides a mechanism for collaboration and mutual effort (Evans & Kansy, 2021). Linking also creates a lock-in effect, increasing the irreversibility of climate policies amid changing political narratives. Once interconnected, countries become more entrenched in their emission-reduction commitments, leading to greater stability for long-term climate action (Evans & Kansy, 2021).

Despite growing interest in ETS linking worldwide, a comprehensive understanding of its potential within the context of the CAREC region remains limited. While previous studies have provided valuable insights into other regions, the unique economic, political, and environmental characteristics of Central Asia necessitate further research. Research supports ETS use as an effective mechanism for mitigating climate change; however, the high costs associated with ETS implementation and maintenance often pose challenges. This is particularly acute in developing countries such as those in the CAREC region. Thus, ETS linking presents a promising solution to these economic challenges, and studying its applicability within the CAREC region is crucial for understanding how to effectively leverage this approach for climate action.

This study addresses this gap by exploring the potential for ETS linking within the CAREC region. The research objectives were to explore the concept of ETS linking, examine regional and international experiences, map the current ETS landscape, identify opportunities and challenges, assess applicability,

[3] The other, less frequent types of ETS links include multilateral (three or more ETSs mutually recognizing each other's systems) and indirect (two ETSs linked through a third ETS, which is recognized by both) linkages.
[4] A multilateral linking arrangement enables emission permits issued in one jurisdiction to be utilized interchangeably across all participating jurisdictions.

and provide policy recommendations. By investigating these aspects, this study seeks to inform decision-making processes and advance regional cooperation in climate change mitigation and adaptation.

The remainder of this paper is organized as follows: It begins by outlining the research objectives, followed by an overview of the study's methodology. Then, the theoretical frameworks underpinning ETS and their critical role in addressing climate change are explored. Subsequently, examines international practices are examined, with particular emphasis on the European Union Emissions Trading System (EU ETS), to extract pertinent insights and lessons. The discourse then transitions to the ETS landscape within the CAREC region, presenting an overview of the existing systems and regional environmental initiatives. The subsequent section identifies the key enabling factors for ETS linking in the CAREC region, including environmental ambition, economic composition, political and economic cooperation, and geographical proximity. The paper concludes with policy recommendations to support effective climate action in the CAREC region.

Research Objectives

The objectives of this research address the complexities surrounding the implementation of ETS linking and identify the opportunities and potential benefits of ETS linking in the CAREC region.

Research Objective 1: To explore the concept of ETS linking at the regional level by drawing on insights from international experience.

Research Objective 2: To map the ETS landscape in CAREC countries, including an overview of current NDCs and initiatives directly or indirectly related to ETS.

Research Objective 3: To identify opportunities and challenges associated with ETS linking in the CAREC region.

Research Objective 4: To explore the applicability of ETS linking within the CAREC context, considering specific characteristics, challenges, and the current state of ETS in the region.

Research Objective 5: To provide policy recommendations by offering insights for policymakers and other stakeholders interested in enhancing climate cooperation efforts within the CAREC region based on best practices and lessons learned from international experiences.

These research objectives aim to elucidate the potential opportunities, challenges, and implications of ETS linking in the CAREC region to inform decision-making processes and advance regional cooperation in addressing climate change mitigation and adaptation.

Methodology

To achieve the above objectives, a multi-source comprehensive desk research approach was adopted. This approach integrates diverse methods, including an extensive literature review encompassing international, regional, and CAREC-specific ETS studies and a detailed analysis of international best practices.

Integrating these methods is intended to enhance the current understanding of the applicability, challenges, and benefits associated with ETS linking in the CAREC region. The specific components of the methodology are described below.

Literature Review

This literature review identifies theoretical frameworks, methodologies, and empirical findings from international practices on environmental policies, regional climate cooperation, and ETS linking, focusing on their replicability in the CAREC context. Relevant CAREC studies are emphasized to provide an understanding of the region's progress in innovative climate mechanisms, such as ETS linking. These insights form a strong foundation for the subsequent analysis.

Case Studies and Comparative Analysis

Case studies (i.e., an overview of international practices) and comparative analysis are integrated at all stages to draw insights from regional initiatives, such as the EU ETS, and country-level examples from Kazakhstan and China in the CAREC region. This overview serves as a mechanism to share experiences and best practices for research on ETS linking in the CAREC region. The goal is to identify the most relevant and applicable approach for fostering regional cooperation on ETS linking in the CAREC region.

Through this methodological framework, this study aims to offer valuable insights into ETS linking models and regional cooperation, thereby facilitating informed decision-making processes and promoting sustainable environmental practices across CAREC countries.

Linking Emissions Trading Systems

This section focuses on the theoretical frameworks and international practices surrounding ETS linking. The theoretical frameworks explore the principles and economic models underpinning ETS linkages, emphasizing the efficiency gains, cost-effectiveness, and harmonization of carbon pricing mechanisms across jurisdictions. Concurrently, the section examines international practices and offers insights into existing examples of regional ETS linking. By exploring both theoretical and real-world examples, this section highlights the advantages and obstacles of ETS linking and outlines pathways for better ETS integration.

Theoretical Frameworks

Although individual ETSs have been proven effective in reducing GHG emissions, they can be costly to implement, especially in countries with high abatement costs. Recognizing the constraints of isolated systems, the concept of ETS "linking" has emerged as a practical solution to improve cost-effectiveness and encourage wider participation in carbon markets.

Linking involves connecting two or more ETSs and creating a unified market in which emission allowances can be traded across borders. This concept is attracting increasing attention as an essential step toward the realization of a global carbon market and a solution widely recognized as the most theoretically efficient approach for addressing climate change (International Carbon Action Partnership, 2015). Therefore, ETS

linking is a pragmatic bottom-up approach (Haita, 2013) that can deliver tangible benefits in the short term while making the prospect of a global carbon market more attainable in the long term.

ETS linking is not a straightforward process. System integration can take various forms, each with its own implications for participation and environmental outcomes. Table 1 below outlines the different types of ETS linkages, ranging from simple unilateral recognition to complex multilateral and indirect connections.

Table 1: Types of ETS Linkages

Type of link	Description
Unilateral	One ETS recognizes emission allowances from another ETS, but not vice versa.
Bilateral	Two ETSs mutually recognize each other's emission allowances.
Multilateral	Three or more ETSs mutually recognize each other's emission allowances.
Indirect	Two ETSs are linked through a third ETS, in which they both recognize the third ETS's allowances.

Source: (Evans & Kansy, 2021)

The economic rationale for ETS linking is firmly rooted in the principles of international trade. In this context, countries exchange emission allowances, each with distinct abatement cost curves[5].

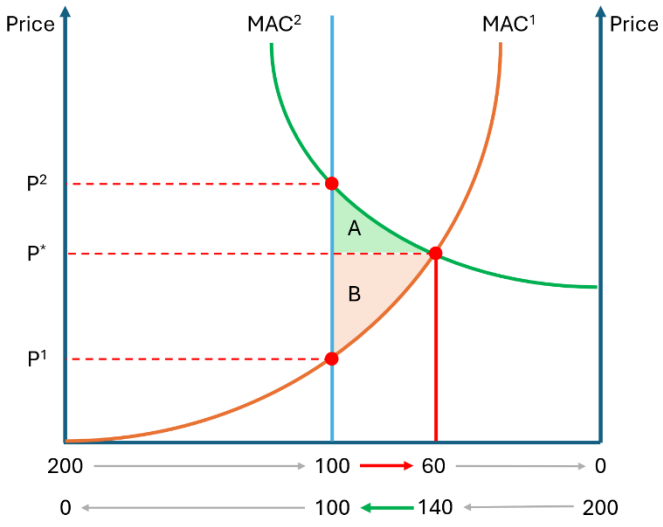
In the absence of a linked ETS, each country operates in a state of autarky, in which emission allowance prices are determined solely by domestic supply and demand dynamics. Consequently, countries with higher abatement costs (i.e., higher marginal costs of emissions reduction) will experience higher allowance prices, whereas those with lower costs will experience lower prices. The fundamental premise of an ETS is that it facilitates trade between markets. Entities in a country with high abatement costs can buy allowances at a reduced price from a linked system with lower abatement costs. This cross-border allowance trade naturally leads to price convergence across linked systems.

This exchange is mutually beneficial. The country "exporting" allowances will reduce its emissions below what it would have under autarky while generating revenue from the sale of allowances. In turn, the importing country benefits from a lower cost of compliance with its emissions-reduction targets. This dynamic mirrors the classic economic concept of gains from trade, in which both parties can achieve outcomes superior to those attainable in a closed economy setting.

[5] Abatement costs represent the financial burden associated with reducing emissions and vary significantly across nations owing to differences in economic structures and technological capabilities (The World Bank, 2023).

Box 1: Economic benefits of ETS linking

The graph[6] demonstrates the economic benefits of ETS linking when countries have different abatement cost curves. Initially, Countries 1 and 2, emit 200 units each. Upon establishing a separate ETS with a cap of 100 units, Country 2, with a higher marginal abatement cost curve (MAC^2), faces a higher autarky price P^2 compared to Country 1's P^1.



Linking systems incentivizes entities in Country 2 to purchase allowances from Country 1. This cross-border demand increases the price in System 1 but decreases it in System 2, ultimately converging at P*. Country 1's emissions decrease to 60, whereas those of Country 2 increase to 140.

Country 2 gains Area A, representing avoided abatement costs. Conversely, despite exceeding its initial cap, Country 1 receives revenue (Area B) from selling allowances. As a result, the combined environmental target is met with a net reduction of 200 units at a lower overall cost.

Another key advantage of ETS linking is enhanced market liquidity. In essence, liquidity refers to the ease with which allowances can be bought or sold without causing significant fluctuations in market prices (International Carbon Action Partnership, 2015). Therefore, by increasing the number of participants, linking creates a larger and more integrated market with better liquidity. This allows for more efficient price formation, thus ensuring that allowance prices reflect the actual supply and demand dynamics within the market. Furthermore, increased liquidity reduces the effect of large transactions on prices. A broader network can better absorb shocks and reduce price volatility because the impact of any single event is distributed across a wider range of actors and regions. This is particularly beneficial when linking partners have distinct economic structures that are not closely correlated (Evans & Kansy, 2021).

In addition to economic advantages, ETS linking offers significant environmental benefits. It helps address concerns about carbon leakage, a phenomenon in which pollution-intensive industries relocate to jurisdictions with less stringent environmental regulations in response to stricter ETS policies. In today's globalized world, in which capital is readily mobile across borders, carbon leakage is a significant risk. Therefore, because ETS linking reduces compliance costs, companies have fewer incentives to relocate their production processes to other jurisdictions. Preventing carbon leakage results in lower aggregate emissions, as reduced economic losses can encourage linked systems to adopt stricter emission caps over time (Point Carbon, 2012).

[6] The graph has been adopted from (Evans & Kansy, 2021)

Finally, ETS linking plays a crucial role in solidifying political commitments to environmental policies. The creation of a network of interconnected systems makes it challenging for countries to backtrack their environmental targets. Although linking does not guarantee complete irreversibility, as demonstrated by some cases of delinking, it significantly enhances the political durability of climate policies. This is essential for building momentum toward broader climate action and facilitating the development of regional and potentially global initiatives. ETS linking also sends strong signals of commitment to long-term climate action, providing businesses with the certainty they need to incorporate climate considerations into their decision-making processes (Haita, 2013).

Although price convergence resulting from ETS linking has many benefits, it also carries potential risks. As mentioned above, in jurisdictions with high abatement costs, the influx of cheaper allowances from linked markets reduces allowance prices. This may inadvertently decrease the incentives for companies to invest in innovative green technologies, as complying with emissions regulations becomes relatively less expensive (Evans & Kansy, 2021).

Moreover, ETS linking could influence the behavior of participating jurisdictions in unintended ways. Some ETSs, particularly smaller ones, may be incentivized to set less ambitious emissions caps to benefit from exporting a larger quantity of allowances (Haites, 2014). This behavior could undermine the primary objective of an ETS, which is to reduce GHG emissions.

ETS linking also introduces the risk of interconnected vulnerabilities. The shock distribution effect noted above can also be perceived as disadvantageous. A key concern is the potential for "imported risk," in which shocks originating in one ETS, such as economic fluctuations or policy changes, can ripple through the linked network, triggering price fluctuations in other systems owing to factors beyond their control. Smaller ETSs are particularly vulnerable to such effects because of their size and relative significance compared to their larger partners (Evans & Kansy, 2021). Additionally, ETS linking can influence the effectiveness of market control mechanisms such as price floors and ceilings. When systems with different mechanisms are linked, these tools can become less effective or even counterproductive. For example, the price floor in one system will be undermined if allowances from another linked system are available below that price (Haites, 2014).

ETS linking involves a degree of compromise because jurisdictions must align their ETS design features to ensure compatibility. This may require some level of adjustment to domestic policies and regulations, potentially leading to resistance if it conflicts with domestic priorities.

Therefore, the decision to link ETSs involves a careful consideration of potential benefits and drawbacks. As summarized in Table 2, linking offers various economic, environmental, and political advantages. However, it also poses challenges that must be met with thoughtful planning and coordination among participating jurisdictions.

Table 2: Advantages and Potential Risks of ETS Linking

Advantages	Potential Risks
Lower aggregate emissions	Risk of less ambitious emissions caps
Lower compliance cost	Potential decrease in incentives for innovation in high-abatement-cost regions
Improved market liquidity	Loss of some control over domestic policy owing to the need for coordination with partners

Reduced price volatility due to a larger, more diverse market	Increased chances for “imported risk”
Mitigation of carbon leakage risk	
Enhanced political durability of climate policies	
Long-term commitment to climate action	

To maximize the benefits and minimize the risks of ETS linking, the selection of linking partners must be considered carefully. One approach is to prioritize jurisdictions with geographical proximity and existing trade ties. This option is often more politically feasible than others, owing to pre-existing relationships. Moreover, linking countries with close economic ties can effectively address the risk of carbon leakage, as it creates a more uniform regulatory environment for businesses operating across borders. Furthermore, if the primary goal is to enhance market liquidity, linking economically similar countries can be a viable option (Evans & Kansy, 2021).

However, linking partners with distinct economic structures could provide greater economic benefits. Differences in economic composition often translate into different abatement costs, and integrating diverse markets can lead to lower compliance costs overall (Doda & Taschini, 2017). However, this approach might require more complex negotiations and coordination because of potential differences in policy priorities and regulatory frameworks, as such differences can be observed between developed and developing countries.

Beyond economic and geographical considerations, environmental ambition can also be a key factor in selecting linking partners. A case study of Brazil’s ETS highlighted that despite potentially higher costs, linking with the EU ETS would result in greater environmental improvement than other options, such as China. This finding underscores the importance of aligning with partners who share a strong commitment to decarbonization and climate action (Oliveira et al., 2021).

No one-size-fits-all solution exists when selecting an ETS linking partner. Making this decision requires a nuanced assessment of various factors, including geographical proximity, existing trade ties, economic structure, and environmental ambition. While linking with neighboring countries or those with established trade relationships can offer political and economic advantages, linking with partners who have distinct economic structures can maximize cost savings. Furthermore, prioritizing environmental ambition can lead to greater emission reductions and facilitate knowledge-sharing related to low-carbon technologies. Ultimately, the decision depends on each country’s unique priorities and characteristics, necessitating a tailored approach to partner selection.

International Practices: EU ETS

Currently, the practice of linking ETSs at the regional level is in its early stages, with the EU being the only major example of a successful regional linkage since its system began operating in 2005, as well as the oldest cap-and-trade system currently active (International Carbon Action Partnership, 2024b). The extensive experience of the EU offers critical lessons for other regions considering similar linkages, as it demonstrates that early strategic planning and gradual implementation can address many of the challenges associated with linking systems across jurisdictions. Thus, the lessons learned from and development processes modeled by major existing ETS links are crucial for exploring the potential of linking ETS across different jurisdictions within a region.

This practice has shown that binding international agreements, such as treaties, are a viable option for national jurisdictions. The harmonization of ETS designs, although not strictly necessary, has been shown to be beneficial. In the case of EU ETS development, member countries were initially allowed autonomy in distributing allowances and operating registries; however, these aspects have since been centralized to ensure that the system functions efficiently.

Centralization allows smaller countries where technical issues or costs would otherwise prevent an ETS from being a feasible policy option, such as Cyprus, Iceland, Liechtenstein, and Malta, to effectively participate in the EU ETS. This example highlights the importance of harmonizing key aspects of ETS design, such as monitoring and reporting standards, to facilitate broader participation and integration. Establishing a link before systems become operational can simplify the process because stakeholders are less likely to resist changes. Linking agreements typically require collaboration on regulatory harmonization, including trade of compliance instruments, joint auctions, common registries, and unified auction platforms. Thus, for jurisdictions at the design stage, cooperation with other systems at a similar stage is crucial for cultivating a common design. Harmonization of features such as monitoring, reporting, and verification (MRV), auction design, and non-compliance penalties significantly facilitates the process of linking with other systems.

When two operational ETSs establish a bilateral link, certain features of one or both systems may require modification to ensure consistency and compatibility. Implementing these changes may be a prerequisite for the effectiveness of the link. Political commitments from both jurisdictions are essential for negotiating these changes. The link can be implemented gradually, starting with mutual unilateral links, possibly at different times. Constraints on the use of imported compliance instruments can be relaxed over time, and a substantial price difference can be narrowed by introducing a common floor price that increases gradually until it aligns with the higher price system, at which point the bilateral link can be fully implemented (Partnership for Market Readiness, 2014).

In addition to the EU's ongoing harmonization efforts, the Swiss ETS has been linked to the EU ETS since 2020. This milestone marks the first international treaty linking the two ETSs, allowing Switzerland to benefit from the EU ETS and gain greater flexibility in achieving its CO_2 targets (Federal Office for the Environment of Switzerland, 2024). An analysis of the current linkage between the EU and Swiss ETSs reveals that, despite initial design differences posing compatibility challenges, these obstacles were overcome through effective technical and political negotiations. Notably, examples of the international linking process have demonstrated that not all features must be harmonized. The use of credits from carbon sinks in the Swiss ETS illustrates that some level of divergence can be managed without undermining the effectiveness of linked systems, thereby highlighting the flexibility of such arrangements (Rutherford, 2014).

In conclusion, although the practice of ETS linking at the regional level continues to evolve, the experience of the EU provides valuable insights. The successful linkage between the EU and Swiss ETSs demonstrates that technical and political challenges can be overcome through negotiations and cooperation. These lessons underscore the importance of strategic planning and collaboration for jurisdictions considering ETS linkages, whether at the design stage or already operational. In exploring the potential of ETS linking in the CAREC region, these foundational experiences provide crucial guidance.

Emissions Trading Systems Landscape in the CAREC Region

This section explores the ETS landscape in the CAREC region to present a comprehensive overview of existing ETSs in the region, their structures, and their efficacy in reducing GHG emissions. Additionally, other significant regional environmental initiatives are examined to highlight collaborative initiatives that complement and enhance regional sustainable development goals. The subsections provide insights into the current state and an understanding of the foundation of perspectives on ETS linking in the CAREC region.

Emissions Trading Systems Overview in the CAREC Region

Currently, China and Kazakhstan are the only two countries in the CAREC region to have implemented an ETS at the national level. Furthermore, Pakistan is the only country in the region that is currently considering market-based climate policy instruments. Analyzing the existing ETSs of China and Kazakhstan and providing an overview of the present situation in Pakistan will provide crucial insight into the current state of emissions trading in the region.

Table 3 summarizes the existing ETS in China and Kazakhstan. The table includes China's subnational ETSs, which were developed before the national system was implemented and are currently active in combination with it.

Table 3: Emissions Trading Systems in the CAREC Region as of 2024

Mechanism	Status	Main price rate	Sectors	Allocation approaches[7]	Offsets Permitted[8]	Coverage threshold[9]
China national ETS (National)	Implemented in 2021	US$12.57	Electricity and heat	Free Allocation, Auctions	Yes, with quantitative limits	26,000 tCO_2-e
Shenzhen pilot ETS (Subnational – City)	Implemented in 2013	US$8.96	Electricity and heat, Industry, Mining and extractives, Transport, Buildings	Free allocation, Auctions,	Yes, with quantitative limits	3,000 tCO_2-e

[7] Allocation approaches in ETSs are methods of distributing emissions allowances to covered entities, including free allocation (distributed at no cost to covered entities based on criteria such as historical emissions or production levels), auctioning (sold through auctions), grandfathering (allocated based on historical emissions or production), benchmarking (allocated based on performance benchmarks, such as emissions per unit of output), and hybrid approaches.

[8] Offsets permitted in an ETS are credits earned from projects outside the regulated sectors that reduce GHG emissions and are used by entities to comply with emission-reduction obligations within the ETS framework.

[9] The coverage threshold in an ETS refers to the minimum level of emissions or activity within a sector or entity that determines whether it falls under the regulatory requirements of the ETS.

Shanghai pilot ETS (Subnational – City)	Implemented in 2013	US$10.06	Electricity and heat, Industry, Mining and extractives, Aviation, Buildings, Agriculture, forestry and fishing fuel use	Free allocation, Auctions,	Yes, with quantitative limits	10,000 tCO_2-e to 100,000 tCO_2-e
Beijing pilot ETS (Subnational – City)	Implemented in 2013	US$14.51	Electricity and heat, Industry, Transport, Buildings	Free allocation, Auctions,	Yes, with quantitative limits	5,000 tCO_2-e
Guangdong pilot ETS (Subnational – State/Province)	Implemented in 2013	US$8.94	Electricity and heat, Industry, Mining and extractives, Aviation	Free allocation, Auctions,	Yes, with quantitative limits	10,000 tCO_2-e
Tianjin pilot ETS (Subnational – City)	Implemented in 2013	US$4.71	Electricity and heat, Industry, Mining and extractives, Aviation	Free allocation, Auctions,	Yes, with quantitative limits	20,000 tCO_2-e
Hubei pilot ETS (Subnational – State/Province)	Implemented in 2014	US$5.62	Electricity and heat, Industry, Mining and extractives	Free allocation, Auctions,	Yes, with quantitative limits	10,000 tCO_2-e
Chongqing pilot ETS (Subnational – City)	Implemented in 2014	US$5.99	Electricity and heat, Industry	Free allocation, Auctions,	Yes, with quantitative limits	13,000 tCO_2-e
Kazakhstan ETS (National)	Implemented in 2013	US$1.06	Electricity and heat, Industry, Mining and extractives	Free Allocation	Yes, unlimited	20,000 tCO_2-e

Source: Carbon Pricing Dashboard, World Bank Group

China's transition from subnational ETSs to a national ETS was a phased and strategic process that resulted in a gradual scale-up to a comprehensive national system. This process highlights the broader array of environmental regulatory instruments China has employed to address climate change. In addition to its ETS, China simultaneously implemented various market- and non-market-based instruments to address climate issues, including subsidies for renewable energy, energy-efficiency standards, and direct emissions regulations[10].

Policy implementation at the subnational level presents challenges and opportunities that may have been utilized in the effective development and implementation of the nationwide ETS. Throughout 2013–2014,

[10] Refer to the Institute for Global Environmental Strategies (IGES), Nationally Determined Contributions (NDC) Database, version 7.7.

seven pilot regions were selected based on their diverse economic structures and industrialization levels, and the pilot ETS programs were subsequently launched[11]. The pilot programs aimed to test approaches to carbon trading, build technical and institutional expertise, and identify best practices for the development of a national system (Table 1). China's use of non-market-based instruments such as mandatory energy efficiency standards and renewable energy mandates complemented the market-based approaches of the ETS pilots. These non-market tools may have helped address gaps that the ETS alone could not cover, such as improving energy efficiency across various sectors and incentivizing the deployment of renewable energy technologies.

The results of a multidimensional empirical assessment indicate that China's ETS pilots had statistically significant effects on carbon emissions, carbon intensity, per capita emissions, and energy structure in the covered regions and industries. The more energy-intensive the industry, the larger the effect. The pilot programs also reduced revenues in energy-intensive industries, but had no significant effect on employment or return on assets in these industries (Stavins & Stowe, 2020). These findings underscore the effectiveness of the ETS in reducing emissions, but also highlight the need for complementary policies to mitigate economic impacts and support broader climate goals.

In December 2017, the National Development and Reform Commission formally declared the establishment of a national ETS. The development process took place from 2017 to 2021, and on July 16, 2021, the national ETS became fully operational. The system initially targeted the power sector, the largest source of CO_2 emissions in the country. This development positioned China as the world's largest carbon-trading market. The China Emissions Trading System (CETS) is a flexible market mechanism that encourages leading carbon-trading market stakeholders to incentivize green innovation to maintain their competitive edge.

China's national ETS was designed for gradual expansion to include additional sectors such as steel, cement, and chemicals, enabling a manageable and controlled scaling process. The transition also involved integrating existing subnational systems into the national framework, ensuring consistent standards and practices across regions.

Currently, CETS regulates more than 2200 companies in the power sector with annual emissions of more than 26,000 tCO_2, including combined heat and power, as well as captive power plants in other sectors, representing approximately 40% of China's CO_2 emissions. The system requires covered entities to surrender allowances for their emissions, which are allocated based on intensity and benchmarks tied to actual production levels. Compliance obligations vary by power generation type and are relatively limited. The latest CETS policy development occurred in February 2024, when the State Council significantly increased penalties for noncompliance, data fraud, and market manipulation, strengthening the regulatory environment (International Carbon Action Partnership, 2024a). Therefore, recent developments reflect China's phased approach toward strengthening both market and regulatory mechanisms to enhance the effectiveness of its climate policies.

Kazakhstan launched its ETS in January 2013, with the development and preparation process starting in 2011, becoming the first country in Asia to implement an economy-wide ETS[12]. In the first two phases, allocations were assigned based on grandfathering, with every company facing the same reduction

[11] Despite the introduction of a national ETS in China, subnational ETSs remain active.
[12] Referred to as KAZ ETS.

requirement. This faced strong opposition from businesses because this method did not consider sector-specific circumstances or the unreliability of historical data (EDF, USAID, IETA, 2016). The system was briefly suspended in 2016 and 2017 to address operational issues and allocation rules. Currently, the ETS uses a free allocation method (based on benchmarking). By 2022, the system accounted for 47% of Kazakhstan's CO_2 emissions, originating from 201 facilities across the power, centralized heating, extraction, and manufacturing sectors (International Carbon Action Partnership, 2024d).

Comparing the fundamental characteristics of the CETS and KAZ ETS, both systems limit their scope to CO_2 emissions exclusively among the GHG credits traded within their frameworks. However, several distinctions can be noted. KAZ ETS has broader sectoral coverage, encompassing the electricity and heat, industry, mining, and extractive sectors, whereas CETS primarily includes the electricity and heat sectors. Regarding allocation mechanisms, CETS offers a more varied approach with options for free allocation through methods such as grandparenting, benchmarking, and auctioning. In contrast, Kazakhstan relies solely on free allocation via benchmarking. Furthermore, CETS imposes quantitative limits on offsets, whereas Kazakhstan does not restrict offset usage. Notably, both CETS and KAZ ETS designate installations rather than companies.

Furthermore, offsets are permitted in both China and Kazakhstan, although the systems differ in their approach. In Kazakhstan, the use of offsets is unlimited, providing companies with substantial flexibility to meet their compliance obligations through external emission-reduction projects. This can enhance cost-effectiveness and market liquidity. In contrast, China imposes a quantitative limit on offsets, which helps ensure that the primary focus remains on domestic emission reductions while still allowing some flexibility. Both approaches have their merits: Kazakhstan's unlimited offset option supports broader investment in green projects, whereas China's limits aim to balance flexibility with a strong emphasis on internal emissions control. These differences highlight the varying approaches and complexities of ETS implementation across different countries, even within the same region.

Among the CAREC countries, apart from China and Kazakhstan, Pakistan has expertise in ETS development. Currently, Pakistan is considering market-based climate policy instruments, including an ETS, to leverage low-cost abatement opportunities and attract low-carbon investments, particularly in the power and industrial sectors. With the support of the UNFCCC and World Bank, Pakistan is developing an MRV roadmap and establishing a domestic ETS framework. Progress has been made in creating a national carbon registry, which is expected to be launched soon. Additionally, through the World Bank's Partnership for Market Implementation (PMI) program, Pakistan is advancing its work on domestic carbon pricing policies, international carbon markets, MRV frameworks, and capacity-building (International Carbon Action Partnership, 2024e).

The varying approaches to ETSs in the CAREC region illustrate the diverse strategies and priorities of different countries, which are crucial for discussions on regional ETS linking. While Kazakhstan's ETS covers a broader range of sectors and focuses on free allocation through benchmarking, China's ETS employs a mix of allocation methods and imposes limits on offsets. Pakistan's ongoing efforts to develop its ETS, supported by international organizations, demonstrate the commitment in the region to enhancing climate policy and leveraging market-based instruments. Thus, understanding the similarities and differences across various systems is essential for potential regional ETS linking.

Regional Environmental Initiatives

Given the region's vulnerability to climate-related physical risks, the CAREC program has prioritized climate change. CAREC's vision, outlined in the document "Regional Action on Climate Change: A Vision for CAREC," focuses on three key areas: working toward carbon neutrality by mid-century, adapting to the unavoidable impact of climate change, and collaborating across borders to address shared environmental challenges (CAREC, 2023b). This comprehensive plan demonstrates CAREC's dedication to fighting climate change through regional cooperation, aligning with global efforts, and fostering the exchange of knowledge and resources.

In response to the growing threat of climate change, CAREC countries have launched several initiatives to mitigate its impact. Among these is the Regional Environmental Center for Central Asia (CAREC-E), which was established in 2001 by five Central Asian republics in partnership with the EU and UNDP. CAREC-E is a vital resource for the region, providing a centralized hub for information-sharing, research, policy guidance, capacity-building, and advocacy on environmental and climate-related matters (CAREC, 2023a).

Recognizing the importance of cooperation in the CAREC region has led to the establishment of two key initiatives focusing on the Aral Sea Basin. The International Fund for Saving the Aral Sea (IFAS) addresses broad environmental and socioeconomic consequences, whereas the Scientific Centre of the Interstate Commission for Water Coordination in Central Asia (ICWC) plays a pivotal role in water resource management. The ICWC is responsible for making critical decisions regarding water allocation and use among the five member countries, including setting schedules for reservoir operations. Its mandate also extends to developing water-pricing policies and legal frameworks, coordinating large infrastructure projects, creating a shared information base on water resources, and developing joint disaster-prevention programs (CAREC, 2023a).

International financial institutions serve as key facilitators of joint climate action within CAREC countries by providing financial resources, technical expertise, and platforms for regional cooperation. One notable initiative showcasing this collaboration is the Caucasus, Central Asia, and Mongolia Regional Capacity Development Center (CCAMTAC), a regional center of the IMF. This platform focuses on macroeconomic analysis, fiscal policy, and monetary policies to address crucial economic challenges with potential implications for climate action (CAREC, 2023a). The World Bank also contributes significantly through its Climate and Environment (CLIENT) program in Central Asia. This program is divided into three sub-programs that focus on resilient landscapes, circular economy, emissions reduction, and climate communication (The World Bank, 2021).

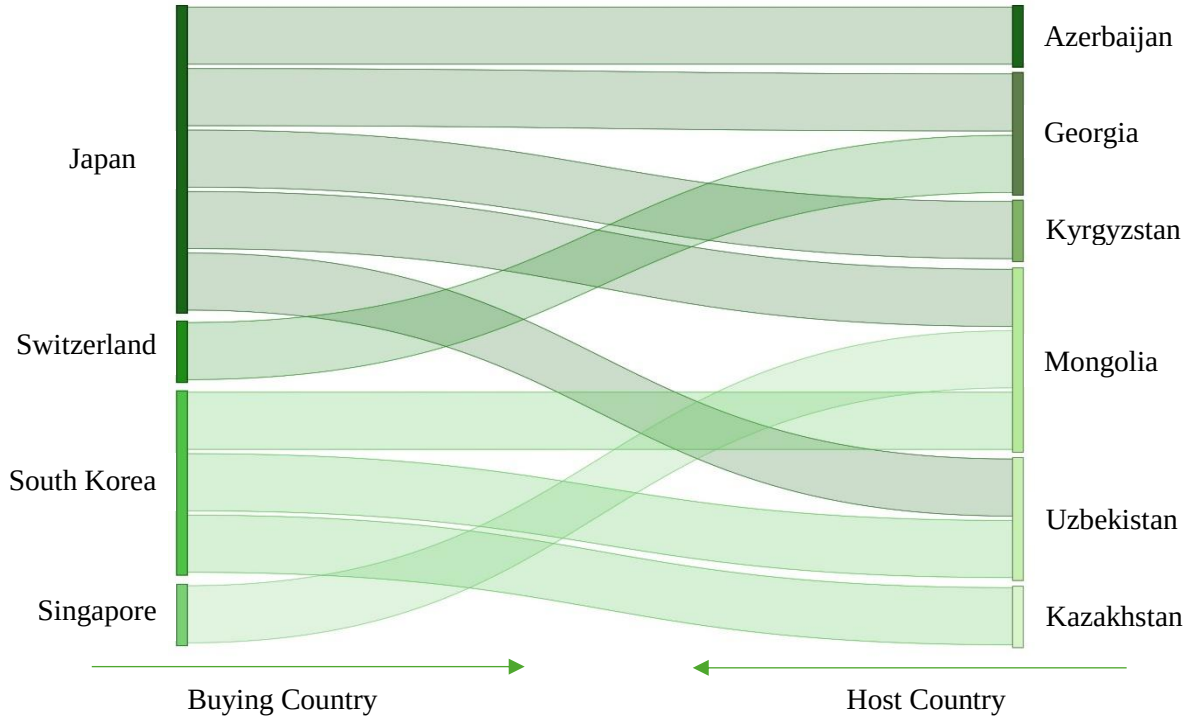
Regional initiatives to mitigate climate change in CAREC countries are supported by various institutions beyond financial organizations. A prime example is the Green Central Asia Regional Programme, a joint initiative of the EU and the German government. Spanning six countries, including Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, this program prioritizes enhancing access to information and risk analyses, increasing the ability of participating nations to assess the impact of climate change and implement preventive measures (Green Central Asia, n.d.).

Additionally, Article 6 of the Paris Agreement provides a framework for international cooperation on climate action, allowing countries to work together voluntarily to achieve their emission reduction targets.

This mechanism enables carbon credits [13] earned from reducing GHG emissions to be transferred, effectively helping other nations meet their climate goals (EDF).

CAREC member states are actively engaging in this global effort by collaborating with countries outside the region to combat climate change. The existing bilateral agreements in CAREC countries are outlined in Figure 1.

Figure 1: Bilateral Agreements within Article 6 of the Paris Agreement in CAREC member states



Source: UNEPCCC

Article 6 of the Paris Agreement could play a crucial role in mobilizing climate finance and bridging the gap between developed and developing countries in the CAREC region. By creating a framework for the transfer of funds, expertise, and resources, developing nations can be empowered to meet their emission-reduction targets and adapt to challenges related to climate change.

Several climate change initiatives have been implemented in the CAREC region, supported by both the CAREC program itself and various international institutions. This highlights a growing commitment to addressing environmental challenges in Central Asia. Taken together, these diverse initiatives demonstrate a significant degree of existing cooperation and a willingness to intensify collaborative efforts within the CAREC region and with external partners.

[13] Article 6 of the Paris Agreement enables host countries to transfer mitigation outcomes to buying countries. The term "mitigation outcome" refers to the verifiable removal or reduction of GHG emissions (CSE).

Enabling Factors of ETS Linking in the CAREC Region

This section provides an overview of the enabling factors of ETS Linking in the CAREC region based on theoretical and practical implications. Although ETS implementation is currently limited in the CAREC region, significant potential exists for both regional and international linkages. Considering that China and Kazakhstan are the only CAREC countries with operational ETSs, their systems provide the foundation for regional linkages with countries without an established national ETS framework[14].

Potential facilitators of ETS linking and climate mitigation cooperation within the region can stem from factors such as similar environmental ambitions, economic composition, political and economic cooperation between partner countries, and geographical proximity. This section explores these factors thoroughly, offering an overview of each followed by a subsection that specifically addresses the potential challenges associated with ETS linking in the CAREC region.

Environmental Ambition

ETS linking between countries with similar environmental targets fosters a more equitable distribution of benefits, strengthens partnerships, and paves the way for more ambitious emission-reduction goals over time. However, as illustrated in Figure 1, the current landscape of environmental ambition in CAREC countries, as assessed by their NDC targets, is diverse. This diversity necessitates careful consideration when identifying potential linking partners to ensure compatibility and maximize the positive outcomes of collaboration.

Mitigation types also differ among countries from relative to absolute emission reduction. Furthermore, only a few countries mention market mechanisms in their NDCs (i.e., China, Kazakhstan, and Pakistan). Regarding similarities, the NDCs of all the CAREC countries have nationwide coverage and focus on CO_2 emissions[15].

CAREC countries can be broadly organized into three categories based on their unconditional GHG reduction targets to be met by 2030:

1. **High Ambition:** China is the only country in this category. It has set ambitious mitigation targets (65% reduction) and established a national ETS, making it a potential leader in regional ETS linking initiatives.

2. **Moderate Ambition:** This category includes Azerbaijan, Georgia, Uzbekistan, and Tajikistan. They set relatively ambitious targets (35%) and express interest in developing an ETS. These countries could be potential partners for China in the EU in future linking endeavors, provided they strengthen their ETS infrastructure and regulatory frameworks.

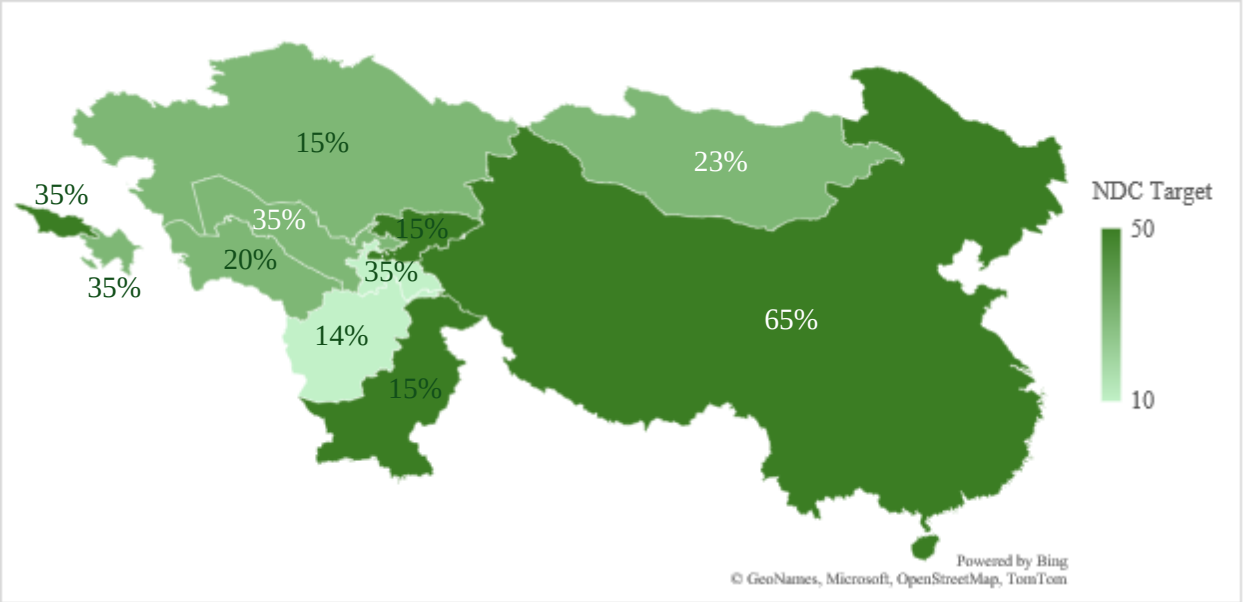
3. **Low Ambition:** Afghanistan, Kazakhstan, Kyrgyzstan, Turkmenistan, Mongolia, and Pakistan comprise this group, as they have set lower mitigation targets (15–25%). Given that an ETS is already operating in Kazakhstan, other countries can potentially become trading partners based on

[14] Countries with similar climate mitigation goals and economic structures could potentially link with either China or Kazakhstan to foster regional cooperation on climate action. Moreover, linkages with ETSs outside the CAREC region, such as the EU ETS, are also possible. This is particularly relevant for Georgia, a candidate for EU accession, as it opens up the possibility of linking with the EU ETS in the future.

[15] For further information, see Annex 2: Comparison of NDCs in CAREC countries.

their environmental ambition. However, linking low-ambition countries may not substantially reduce overall emissions.

Figure 2: Unconditional GHG Emission-Reduction Targets in CAREC Countries by 2030 (as per NDCs)



Source: Institute for Global Environmental Strategies (IGES), Nationally Determined Contributions (NDC) database version 7.7.

In addition to the NDC targets, CAREC member states' environmental commitment is evident in some of the tools they employ to reduce GHG emissions. Although these instruments differ by country, many Central Asian nations are focusing on improving energy efficiency and diversifying their energy mix through regulatory or project-based approaches. For example, Kyrgyzstan implemented medium-term tariff reforms for electricity, heating, and hot water in 2021, raising energy prices for pumping stations, budgetary institutions, industrial and agricultural sectors, and energy-intensive consumers to encourage the adoption of cleaner and more energy-efficient sources (Council, 2021). Meanwhile, Uzbekistan is expanding its wind power generation through the Zarafshan Wind Power Project in partnership with the Asian Development Bank (ADB). Once completed, this project will be the largest wind farm in Central Asia, marking a major step forward in the country's renewable energy efforts (ADB, Building Central Asia's Biggest Wind Farm, n.d.). A major source of emissions in the region is the gas flaring at the Darvaza Crater in Turkmenistan. However, in 2022, Turkmengas announced a plan to extinguish the crater, aiming to reduce emissions and put the gas into productive use. Recent data indicate that the plan is working with emissions decreasing by 70% annually (Davis, 2024).

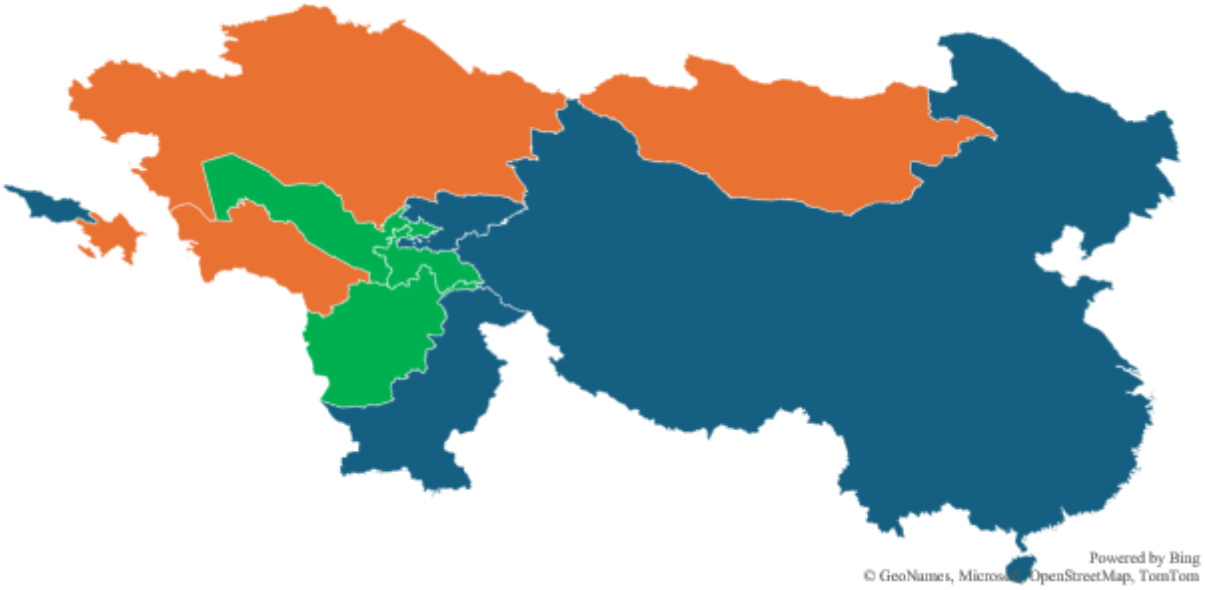
Economic Compositions

As discussed in the section on theoretical frameworks, linking ETSs across countries with diverse economic structures increases the economic benefits of these systems. This approach allows for efficient resource allocation. Those with cost-effective abatement options can readily reduce emissions, whereas others with carbon-intensive industries can access cheaper allowances.

The economic landscape of CAREC countries is characterized by a diverse range of structures, implying that the abatement costs for reducing emissions are likely to vary significantly across the region, influencing the potential benefits of ETS linking.

Based on the economic indicators presented in Table 4, CAREC countries fall into three major groups (Figure 3).

Figure 3: Economic Profiles of CAREC Countries



Agriculture-Dependent Economies	**Characteristics**: High share of agriculture in GDP (over 20%), relatively low energy and carbon intensity, reliance on agricultural exports. **Linking Considerations**: These countries could benefit from linking with partners with complementary economies, such as those with strong service sectors, to diversify their economies and gain access to new markets.
Energy-Intensive Industrial Economies	**Characteristics**: Significant share of industry in GDP (over 30%), high energy and carbon intensity, reliance on energy exports. **Linking Considerations:** These countries could benefit from linking with partners with strong environmental policies and advanced low-carbon technologies to help them decarbonize their economies and diversify their energy mix.
Diversified Economies with Growing Service Sectors	**Characteristics**: Relatively balanced share of agriculture, industry, and services in GDP; varying levels of energy and carbon intensity. **Linking Considerations:** These countries have more flexibility in choosing linking partners, as they can prioritize either economic complementarity or environmental ambition depending on their goals and priorities.

Table 4: Economic Profiles of CAREC Countries (2022)

Country	Value added, % of GDP				Energy Intensity (kWh)	Carbon Intensity (gCO_2)
	Agriculture	Industry	Manufacturing	Services		
Afghanistan	37%	14%	8%	47%	0.48	133
Azerbaijan	5%	56%	5%	32%	1.17	671
China	7%	40%	28%	53%	1.68	586
Georgia	6%	21%	10%	60%	1.22	167
Kazakhstan	5%	35%	13%	53%	1.67	830
Kyrgyzstan	11%	22%	11%	53%	2.04	147
Mongolia	13%	35%	7%	41%	1.76	772
Pakistan	22%	20%	14%	52%	0.85	464
Tajikistan	22%	35%	15%	33%	1.60	117
Turkmenistan	12%	37%	-	51%	4.69	1,306
Uzbekistan	25%	31%	20%	36%	1.51	1,168

Source: World Bank, Our World in Data.

Linking complementary economies characterized by distinct sectoral compositions can significantly decrease the aggregate costs of meeting environmental targets. However, this approach often creates winners and losers across systems, which can make linking a less attractive proposition for countries with lower autarky prices. In such cases, linking with countries that have similar economic profiles still has some advantages. By focusing on partners with comparable abatement costs and sectoral compositions, countries can prioritize the enhancement of carbon market liquidity and price stability. This approach creates a more predictable and efficient market environment, thereby reducing the risk of price volatility and ensuring a more equitable distribution of costs and benefits among participants.

Political and Economic Cooperation

Existing practices demonstrate that countries with common ETS frameworks can achieve a higher level of coordination if they already have established economic and political cooperation. Integrated markets have emerged in sovereign states or supranational organizations, such as the EU ETS and Regional Greenhouse Gas Initiative (RGGI)[16], or through previous regional cooperation, such as the WCI[17] trading system. This suggests that future clusters of linked markets could develop near influential policy leaders, such as the EU and China, or within cooperative forums (Mehling & Görlach, 2016). Therefore, existing cooperation platforms could facilitate potential ETS linking between Central Asian countries. In this context, partnerships within the CAREC Program can catalyze further multilateral cooperation on climate change mitigation through ETSs. Furthermore, existing economic cooperation frameworks can serve as a solid foundation for future ETS linking initiatives.

[16] RGGI is a cooperative, market-based effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont to cap and reduce CO_2 emissions from the power sector. It is the first cap-and-invest regional initiative implemented in the United States.
[17] The Western Climate Initiative (WCI) is a collaboration between western states, Canadian provinces, and Mexican states to reduce GHGs in the region.

CAREC countries have strong economic ties, as evidenced by the network of regional trade agreements (RTAs) in place. Several countries in the region have established bilateral RTAs, suggesting a strong foundation for economic cooperation. For example, Georgia[18] has signed RTAs with China, Azerbaijan, Kazakhstan, and Turkmenistan. Azerbaijan also has agreements with Kyrgyzstan and Kazakhstan, while Kazakhstan, Kyrgyzstan, and Uzbekistan have bilateral RTAs in place. Pakistan and China have also established a bilateral RTA (WTO, 2024). According to the Asia-Pacific Regional Cooperation and Integration Index (ARCII), Central Asia is the most integrated Asian subregion in terms of institutional arrangements at the intra-subregional level and in regional value chains at the inter-subregional level (ADB, 2024).[19] These factors help align regulations and facilitate cross-border carbon pricing, increasing the feasibility of implementing a unified ETS.

This established groundwork for economic collaboration has positive implications for future ETS linking efforts. This suggests that the necessary political and institutional frameworks are already in place to facilitate negotiations and the implementation of cross-border carbon market mechanisms, ultimately contributing to a more integrated and effective regional approach to climate change mitigation.

Geographical Proximity

ETS linking is often facilitated by geographical proximity and driven by factors such as shared environmental conditions and transporting pollutants across borders. Adjacent countries typically face similar environmental and climate-related challenges. This proximity increases the likelihood of pollutants crossing borders, motivating countries to collaborate on harmonized emissions trading targets and climate policies. Notably, most multilateral links to date have been created between geographically close jurisdictions that and already have strong political and economic relationships (Santikarn et al., 2018).

Thus, experiences with existing ETSs indicate that jurisdictions with aligned environmental ambitions and economic compositions, strengthened by economic and political ties, are more likely to successfully coordinate ETS linking. Looking forward, the CAREC Program can facilitate ETS linking in Central Asia.

Challenges

Despite the positive implications and opportunities for developing regional ETSs among CAREC countries, some substantial challenges need to be carefully considered and addressed to develop an efficiently linked ETS. This section first provides an overview of country-specific factors that could individually hinder ETS implementation and maintenance. Subsequently, the challenges associated with linking are presented separately.

Based on the analyses in this study, Table 5 summarizes the major challenges associated with ETS implementation in CAREC countries[20].

[18] In this context, Georgia presents an interesting case, as it maintains economic ties with countries in the CAREC region that already have established ETSs while also being a candidate for EU accession. This dual connectivity suggests the potential for Georgia to link its ETS with the EU ETS, reflecting its unique position amid evolving regional and international climate policy frameworks,

[19] However, integration indices for Asian subregions are significantly lower compared to those of the EU and North America.

[20] This table excludes China and Kazakhstan as they have already implemented national ETSs, and Pakistan, which is already in process of ETS development.

Table 5: Factors hindering ETS adoption in CAREC countries

Country	Factors hindering ETS adoption
Afghanistan	• **Economic Constraints:** Afghanistan's ongoing conflict and economic instability pose significant challenges ETS implementation. The country faces urgent socioeconomic issues that take precedence over long-term climate strategies. • **Institutional Capacity:** Limited institutional infrastructure and resources for environmental management hinder the establishment of an ETS. • **Political and Social Factors:** Political instability and security concerns overshadow environmental policy efforts, making it difficult to focus on market-based climate solutions.
Azerbaijan	• **Energy Dependency:** Azerbaijan's economy relies heavily on oil and gas exports. Transitioning to an ETS could face resistance from these key sectors, which are crucial for the country's revenue. • **Economic Constraints:** Although Azerbaijan has some financial resources, the focus remains on economic diversification and development, potentially sidelining ETS implementation. • **Institutional Capacity:** The country is in the early stages of developing its environmental regulatory framework, which could impact readiness for ETS adoption.
Georgia	• **Economic Constraints:** Georgia's economy, while growing, still faces constraints in the financial and technical resources required to establish an ETS. • **Institutional Capacity:** Georgia has made progress in environmental management but still requires further development in MRV systems and regulatory frameworks to support an ETS. • **Political and Social Factors:** Political will to implement market-based climate solutions is growing in Georgia; however, aligning various stakeholders and sectors may be challenging.
Kyrgyzstan	• **Economic Constraints:** The Kyrgyz Republic deals with significant economic challenges, and the cost of setting up and maintaining an ETS may be prohibitive. • **Energy Dependency:** The country relies on a mix of hydroelectric power and fossil fuels, which could complicate the transition to an ETS. • **Institutional Capacity:** Limited technical and institutional resources for environmental management could hinder ETS development and implementation.
Mongolia	• **Energy Dependency:** Mongolia relies heavily on coal for energy, making the transition to an ETS challenging owing to the economic and political implications for the coal industry.

	• **Economic Constraints:** Although Mongolia is experiencing economic growth, it continues to face challenges related to poverty and infrastructure development that could affect ETS implementation. • **Institutional Capacity:** Although Mongolia country is developing environmental policies, it may lack the comprehensive systems required for an effective ETS.
Tajikistan	• **Economic Constraints:** Tajikistan's low GDP per capita and economic vulnerabilities make the costs associated with ETS implementation a significant barrier. • **Institutional Capacity:** Limited institutional resources would make the development of effective environmental regulations and MRV systems challenging. • **Political and Social Factors:** Immediate socioeconomic challenges often overshadow long-term climate strategies, affecting the prioritization of an ETS.
Turkmenistan	• **Energy Dependency:** The heavy reliance of Turkmenistan's economy on natural gas and oil poses challenges for transitioning to an ETS, particularly because of the potential economic impact on these sectors. • **Economic Constraints:** The country's focus on energy exports and infrastructure development may limit the financial and technical resources available for ETS implementation. • **Institutional Capacity:** Turkmenistan is still developing its environmental regulatory frameworks, which may impede ETS establishment.
Uzbekistan	• **Economic Constraints:** Uzbekistan's economy centers on natural gas and cotton, making it difficult to allocate resources for an ETS without affecting these major sectors. • **Institutional Capacity:** The country is developing environmental management systems but lacks the fully developed infrastructure required for an ETS. • **Energy Dependency:** Heavy reliance on fossil fuels complicates a potential transition to an ETS, which may face resistance from entrenched interests in the energy sector.

ETS linking can enhance market efficiency, reduce compliance costs, and foster regional cooperation in addressing climate change. However, linking different ETSs involves a range of complex challenges that stem from differences in ETS design, regulatory frameworks, and political priorities between participating jurisdictions. The list below summarizes the major challenges in the region that may hinder the implementation of linked ETSs.

- **Infrastructure:** Setting up a common registry and unified auction platform requires significant technical infrastructure, which is both resource-intensive and time-consuming. Therefore, additional international assistance would be beneficial.

- **Monitoring, Reporting, and Verification:** Effective linking requires the harmonization of MRV processes to ensure that emissions are tracked accurately and reported in a standardized system across jurisdictions. Implementation can also be challenging, as all participating countries must have the capacity for essential MRV activities, especially those with less developed national-level systems.
- **Lack of Capacity:** Limited technical expertise and knowledge gaps in ETS design, implementation, and management may impede the effective functioning of linked systems.
- **Economic Variability:** Economic variability, or policy changes in one country, can significantly affect linked systems, causing unintended price shifts and market instability.
- **Regulatory Alignment:** Aligning policies across jurisdictions, especially those with differing political landscapes and regulatory frameworks (which are visible in the CAREC region), poses significant challenges to implementing an effective ETS. Furthermore, countries may be reluctant to cede regulatory control or make concessions that could be perceived as undermining their sovereignty, further complicating the harmonization of regional climate policies.
- **Economic Structures Divergence:** Differences in economic structures, including sectoral composition and energy intensity, may negatively influence the feasibility and benefits of ETS linking across countries.
- **Private Sector and Public Acceptance:** ETS linking, which fundamentally leads to price convergence, can face significant challenges in gaining acceptance from domestic private stakeholders and the public, especially if it results in perceived inequities. The private sector may be particularly reluctant to support climate-mitigation efforts if the linking process is perceived to create unfair competitive disadvantages or impose disproportionate costs. This issue is more pronounced in countries that do not have stringent emission policies in place.
- **Regional Stability:** The CAREC region comprises countries with diverse political systems and histories of regional tensions. Effective linking requires robust cross-border cooperation, which can be challenging in a region with complex geopolitical dynamics.
- **Financial Resources:** Insufficient financial resources and funding constraints may limit the capacity of CAREC countries to invest in ETS infrastructure, capacity-building, and regulatory enforcement. International financial support and cooperation are essential to bridge these gaps.

In summary, addressing these challenges will be crucial for realizing the potential benefits of ETS linking across the diverse contexts of the CAREC region.

Policy Recommendations

The following recommendations outline strategic pathways for utilizing existing opportunities in the development of regional cooperation on ETS linking and facilitating dialogue, capacity-building, and sustainable climate action across Central Asia.

Utilize the CAREC Platform to Foster Dialogue on ETS Linking: The CAREC platform, with its established network and collaborative environment, presents an ideal opportunity to facilitate dialogue on ETS linking among member countries. Considering existing ties and relationships, the CAREC platform can ensure the participation of government officials, industry representatives, and environmental organizations from all CAREC member countries. Establishing regular forums and workshops through

CAREC will help build a consensus, identify common objectives, and enhance mutual understanding of the benefits and challenges associated with ETS linking. A structured dialogue process should be initiated to ensure continuous engagement and track progress on ETS initiatives across member countries.

Create a Collaborative Roadmap for Climate Change Mitigation through ETSs in the CAREC Region: A comprehensive roadmap with clear milestones and regular progress reviews is essential for maintaining alignment among CAREC countries. This roadmap should outline specific goals, timelines, and responsibilities for each participating country. Regular (biannual or annual) progress meetings should be held to assess advancements, address challenges, and recalibrate strategies as needed. By emphasizing common goals and fostering a collaborative environment, the roadmap will support countries in overcoming political, economic, and resource-related obstacles. The roadmap should also include provisions for international assistance to bolster capacity and resource availability.

Facilitate Knowledge Exchange in the CAREC Region: Leveraging the expertise of countries with operational ETSs, such as Kazakhstan and China, can drive knowledge exchange in the CAREC region. Detailed case studies, thematic workshops, and exchange programs can be organized to disseminate information on successful ETS practices, challenges, and solutions. These sessions should be tailored to the specific needs of countries with similar climate-related goals and economic conditions. Comprehensive knowledge materials and toolkits should be developed to support these exchanges, ensuring that all participating countries have access to relevant information and best practices. This approach will build local expertise, promote best practices, and facilitate smoother adoption of market-based climate policies.

Conduct Socioeconomic and Political Profile Studies for Each CAREC Country: To gain deeper insights into the opportunities for ETS linking, comprehensive socioeconomic and political profile studies should be conducted for each CAREC country. These studies should use qualitative and quantitative methods to analyze the unique contexts, challenges, and capacities of each nation in relation to ETS implementation and linkages. By understanding socioeconomic dynamics, regulatory environments, and political landscapes, tailored strategies can be developed to facilitate effective ETS integration. Studies should include assessments of economic structures, institutional capacities, stakeholder interests, and potential barriers to implementation. By leveraging these insights, member countries can strategically align their efforts and maximize the effectiveness of regional ETS initiatives.

Conduct Individual Quantitative Modeling for Optimal Partnership Identification: Individual quantitative modeling exercises should be conducted in CAREC countries interested in ETS linking to identify the most suitable potential partners. This modeling should focus on assessing compatibility in terms of environmental goals, economic structures, and regulatory frameworks. Furthermore, it should evaluate factors such as emissions coverage, market caps, reduction potential, and economic impact to identify the most compatible partners. Scenarios with varying levels of ambition and policy implications should be included to provide a robust basis for decision-making. Quantitative analyses should prioritize partnerships that maximize mutual benefits, minimize risks, and align with regional climate action goals. This data-driven approach will ensure that countries strategically align their climate policies and optimize the effectiveness of ETS linkages**.**

Harmonize Implementation of National ETS Frameworks: Aligning the frameworks of countries with existing ETSs with those of established systems such as China and Kazakhstan will facilitate integration and linkages. Countries should focus on harmonizing key components such as MRV processes, cap setting,

allocation methods, and compliance rules. Standard operating procedures and technical guidelines should be developed to ensure consistency and comparability across national systems. Furthermore, collaborative workshops and technical assistance should be promoted to support the development of harmonized frameworks and address potential implementation challenges. Ensuring uniformity in these critical areas will enhance market integrity and facilitate smooth integration into a regional ETS network.

Adopt a Phased Approach to Developing Linked ETSs: A phased approach to ETS linking should be developed, starting with bilateral linkages (e.g., between Kazakhstan and Turkmenistan) and then gradually expanding to include more countries with similar interests. Pilot projects should be initiated to test the feasibility and effectiveness of linkages, allowing for iterative adjustments based on practical experience. Clear criteria for expanding the network must be established, including readiness assessments and performance evaluations. This methodical, stepwise strategy can ensure manageable implementation, minimize risks, and build confidence among participating countries. By starting small and scaling up, this approach will promote practical learning and foster trust, thereby creating a strong foundation for a comprehensive and well-integrated regional ETS network.

Enhance Technical Capacity and Awareness for Effective ETS Implementation: Countries should prioritize capacity-building initiatives to address technical gaps in MRV systems and ETS development. This includes raising awareness among the public and businesses about climate issues and preparing them for future regulatory changes. Ensuring readiness in the private sector through knowledge-sharing and technical support will facilitate smooth ETS adoption and operation, thus fostering effective climate action and regulatory compliance. In addition, communication on the economic and environmental benefits of linked ETSs is crucial. Linked ETSs can save costs through efficient allocation of emission allowances and reduce compliance costs for industries operating across borders. Highlighting these benefits can garner support from relevant stakeholders (e.g., the private sector and general public) and encourage countries to participate actively in regional ETS initiatives.

Develop a Guidebook of Targeted Solutions for Addressing Institutional and Economic Challenges: To enhance the practical applicability of this study, targeted solutions must be developed that specifically address the institutional capacity and economic constraints CAREC countries face in ETS implementation. Comprehensive guidelines or instructive activities should be developed to provide a detailed and timed list of steps aimed at removing capacity challenges. This guidebook should be based on international best practices and tailored to the specific needs of CAREC countries. Clear strategies for strengthening institutional frameworks, securing financing, and engaging stakeholders effectively should be outlined. By incorporating these targeted solutions, each CAREC member county will be able to not only identify the challenges but also utilize structured pathways to address them through the developed guidebook. This approach is expected to significantly enhance the overall impact and applicability of this study, ensuring that practical tools are available to support ETS implementation.

Seek International Support for Cooperative ETS Initiatives: Countries aiming to cooperate on ETS initiatives should actively seek international support in technical expertise and financial resources from climate funds and international organizations. This support will be crucial for overcoming technical challenges, building institutional capacity for effective ETS implementation, and ensuring sustainable funding for long-term climate action goals. Additionally, countries in the region must secure funding to develop trading platforms. International organizations will be pivotal in facilitating this process by providing expertise, guidance, and/or financial resources to establish robust and transparent trading

mechanisms. Collaborative efforts to secure international assistance can enhance the feasibility and success of regional ETS linkages, enabling countries to achieve their climate targets more effectively while promoting global cooperation on climate-change mitigation and adaptation.

In conclusion, these recommendations provide a structured approach for harnessing regional opportunities and advancing sustainable climate action through ETSs in CAREC countries. By addressing existing challenges, leveraging opportunities, and fostering collaborative approaches, CAREC member countries can effectively develop and link their ETSs to promote sustainable climate action and achieve regional climate goals.

References

ADB. (2022). Retrieved from By the Numbers: Climate Change in Central Asia: https://www.adb.org/news/features/numbers-climate-change-central-asia

ADB. (2024). *Asian Economic Integration Report 2024.*

ADB. (n.d.). *Building Central Asia's Biggest Wind Farm*. Retrieved from https://www.adb.org/.

Bai, J., & Ru, H. (2022). Carbon Emissions Trading and Environmental Protection: International Evidence. *National Bureau of Economic Research - Working Paper 30587*.

CAREC. (2023a). *CAREC 2030: Supporting Regional Actions to Address Climate Change.*

CAREC. (2023b). *Regional Action on Climate Change: A Vision for CAREC.*

Chai, S., Sun, R., Zhang, K., Ding, Y., & Wei, W. (2022). Is Emissions Trading Scheme (ETS) an Effective Market-Incentivized Environmental Regulation Policy? Evidence from China's Eight ETS Pilots. *International Journal of Environmental Research and Public Health*.

Council, C. E. (2021). *The Kyrgyz Republic approved the Medium-Term Tariff Policy for Electricity and Heat for 2021-2025*. Retrieved from http://energo-cis.ru/: http://energo-cis.ru/ennews/the_kyrgyz_republic_approved/?year=2021

CSE. (n.d.). *Article 6 of the Paris Agreement* .

Davis, M. (2024). *A New Perspective on Old Flames: Satellite Tracking of Emissions Reduction at the 60-Year Darvaza Fire Crater in Turkmenistan.* Retrieved from https://flareintel.com/: https://flareintel.com/insights/a-new-perspective-on-old-flames-satellite-tracking-of-emissions-reduction-at-the-60-year-darvaza-fire-crater-in-turkmenistan

Doda, B., & Taschini, L. (2017). Carbon Dating: When Is It Beneficial to Link ETSs? *Journal of the Association of Environmental and Resource Economists*.

Douris, J., & Kim, G. (2021). *WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970-2019).*

Duenwald, C., Abdih, Y., Gerling, .. K., Stepanyan, V., Al-Hassan, A., Anderson, G., . . . Sanchez, J. (2022). *Feeling the Heat: Adapting to Climate Change in the Middle East and Central Asia.* International Monetary Fund.

EDF. (n.d.). *Article 6 of the Paris Agreement: Harnessing carbon markets for international collaboration, higher climate ambition, and equitable climate finance.*

EDF, USAID, IETA. (2016). *Kazakhstan: An Emissions Trading Case Study*.

European Parliament. (2023). *Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union.* Official Journal of the European Union.

Evans, S., & Kansy, T. (2021). *Emissions Trading in Practice: A Handbook on Design, Second Editions.*

Federal Office for the Environment of Switzerland. (2024). *Linking the Swiss and EU emissions trading systems*. Retrieved from www.bafu.admin.ch:

https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/reduction-measures/ets/linking-swiss-eu.html

Green Central Asia. (n.d.). *About Us*. Retrieved 2024, from greencentralasia.org: https://www.greencentralasia.org/en/page/15/87

Haita, C. (2013). *Linking Emission Trading Schemes: Pros and Cons.*

Haites, E. (2014). *Lessons Learned from Linking*.

Hasna, Z., Jaumotte, F., Kim, J., Pienknagura, S., & Schwerhoff, G. (2023). *Green Innovation and Diffusion: Policies to Accelerate Them and Expected Impact on Macroeconomic and Firm-Level Performance.* International Monetary Fund.

International Carbon Action Partnership. (2015). *Linking Emissions Trading Systems: A Summary of Current Research.*

International Carbon Action Partnership. (2024a). *China National ETS*. Retrieved from icapcarbonaction.com: https://icapcarbonaction.com/en/ets/china-national-ets

International Carbon Action Partnership. (2024b). *EU Emissions Trading System (EU ETS)*. Retrieved from icapcarbonaction.com: https://icapcarbonaction.com/en/ets/eu-emissions-trading-system-eu-ets

International Carbon Action Partnership. (2024c). Retrieved from ICAP ETS Map: https://icapcarbonaction.com/en/ets

International Carbon Action Partnership. (2024d). *Kazakhstan Emissions Trading System*. Retrieved from icapcarbonaction.com: https://icapcarbonaction.com/en/ets/kazakhstan-emissions-trading-system

International Carbon Action Partnership. (2024e). *Pakistan*. Retrieved from icapcarbonaction.com: https://icapcarbonaction.com/en/ets/pakistan

Mehling, M., & Görlach, B. (2016). *Multilateral Linking of Emissions Trading Systems.* MIT Center for Energy and Environmental Policy Research.

Oliveira, T. D., Gurgel, A. C., & Tonry, S. (2021). Potential trading partners of a brazilian emissions trading scheme: The effects of linking with a developed region (Europe) and two developing regions (Latin America and China). *Technological Forecasting and Social Change*.

Partnership for Market Readiness. (2014). *Lessons Learned from Linking Emissions Trading Systems: General Principles and Applications.* Technical Note 7 prepared for the World Bank .

Point Carbon. (2012). *Carbon Pricing, Emissions Trading and Linking Emissions Trading Schemes.*

Rutherford, A. P. (2014). Linking Emissions Trading Schemes: Lessons from the EU-Swiss ETSs. *Carbon & Climate Law Review, Vol.8, No.4*.

Sabyrbekov, R., Overland, I., & Vakulchu, R. (2023). Introduction to Climate Change in Central Asia. *SpringerBriefs in Climate Studies* , 1-11.

Santikarn, M., Li, L., Theuer, S., & Haug, C. (2018). *A Guide to Linking Emissions Trading Systems.* Berlin: International Carbon Action Partnership.

Stavins, R. N., & Stowe, R. C. (2020). *Subnational Climate Change Policy in China.* Cambridge, Massachusetts: Harvard Project on Climate Agreements.

The World Bank. (2021). *Climate and Environment (CLIENT) Program in Central Asia*. Retrieved from worldbank.org.

The World Bank. (2023). *What You Need to Know About Abatement Costs and Decarbonization*. Retrieved from worldbank.org.

UNFCCC. (2024). Retrieved from Nationally Determined Contributions Registry: https://unfccc.int/NDCREG

WTO. (2024). *Regional Trade Agreements Database*. Retrieved from rtais.wto.org/.

Annex 1: GHG Emissions of CAREC Countries

GHG Emissions of CAREC Countries in 2022

Country	GHG Emissions Per Capita (CO_2 eq)	Annual GHG Emissions (CO_2 eq)	Contribution to Total Regional GHG Emissions
Afghanistan	0.9	36,614,290	0.2%
Azerbaijan	6.8	70,603,160	0.5%
China	9.8	13,943,689,000	90.6%
Georgia	2.5	9,346,659	0.1%
Kazakhstan	18.5	357,956,380	2.3%
Kyrgyzstan	3.1	20,730,278	0.1%
Mongolia	24.0	81,538,510	0.5%
Pakistan	2.2	520,090,050	3.4%
Tajikistan	2.1	21,352,390	0.1%
Turkmenistan	20.2	129,964,350	0.8%
Uzbekistan	5.9	205,844,820	1.3%

Source: Our World in Data

Annex 2: Comparison of NDCs in CAREC Countries

Country	Mitigation Type	Mitigation Target by 2030	Climate Pledge on Mitigation	Mention of Market Mechanisms
Afghanistan	Relative emission reduction	13.6% (conditional)	GHG emissions will be reduced by 13.6% by 2030 compared to the business as usual (BAU) 2030 scenario, conditional on external support.	A targeted financial mechanism consisting of two components should be created to finance climate change mitigation and adaptation projects: 1) An internal (domestic) climate revolving civil funding, to be replenished on a permanent basis with allocations from environmental fees, ecosystem service fees, including "carbon taxing." 2) An external (international) financial mechanisms with resource provision following the principle of additionality, such as the Green Climate Fund, Adaptation Fund, the Global Environmental Facility, bilateral and multilateral funds, and other sources.
Azerbaijan	Absolute emission reduction	35%	The Republic of Azerbaijan has set a target to reduce GHG emissions by 35% by2030, compared to 1990/base year, as its contribution to global climate change efforts.	N/A
China	Carbon intensity reduction	65%	・ To have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060; ・ To lower CO_2 emissions per unit of GDP by over 65% from the 2005 level; ・ To increase the share of non-fossil fuels in primary energy consumption to approximately 25% ・ To increase the forest stock volume by 6 billion cubic meters from the 2005 level; and ・ To bring its total installed capacity of wind and solar power to over 1.2 billion kilowatts by 2030.	Making progress in carbon emissions trading market In July 2021, China officially launched the national carbon emissions trading market. The market considers 2021 as the first compliance cycle, and included 2162 key emission units of the power generation sector, covering approximately 4.5 billion tons of CO_2 emissions, representing the largest carbon market worldwide.

Georgia	Absolute emission reduction	35% (unconditional), 50–57% (conditional)	Georgia is fully committed to an unconditional limiting target of 35% below the 1990 level of its domestic total GHG emissions by 2030. Georgia is committed to a target of 50–57% of its total GHG emissions by 2030 compared to the 1990 level with international support. If the world follows a 2℃ average global temperature increase holding scenario, emissions will need to be reduced by 50%. However, in the case of limiting the increase to 1.5℃, emissions will need to be reduced by 57% compared to the 1990 level.	N/A
Kazakhstan	Absolute emission reduction	15% (unconditional), 25% (conditional)	The Republic of Kazakhstan intends to achieve an economy-wide target of a 15% (unconditional target) – 25% (conditional target) reduction in GHG emissions by 2030 compared to 1990.	Kazakhstan supports the inclusion of market-based mechanisms in the 2015 agreement and the opportunity to use carbon units as recognized by the UNFCCC. Kazakhstan retains the option to use market-based mechanisms under the UNFCCC. Kazakhstan will consider adequately discounting international units for compliance to ensure a contribution to net global emission reductions.
Kyrgyzstan	Relative emission reduction	16.63% and 15.97% (unconditional), 36.61% and 43.62% (conditional)	The overall mitigation goal of the Kyrgyz Republic is to unconditionally reduce GHG emissions by 16.63% by 2025 and by 15.97% by 2030, under the BAU scenario. Should international support be provided, GHG emissions will be reduced by 36.61% by 2025 and by 43.62% by 2030 under the BAU scenario.	N/A

Mongolia	Relative emission reduction	22.7% (unconditional), 27.2% and 44.9% (conditional)	The mitigation target of Mongolia's NDC will be a 22.7% reduction in total national GHG emissions by 2030, compared to the projected emissions under a BAU scenario for 2010. In addition, if conditional mitigation measures such as the carbon capture and storage and waste-to-energy technology are implemented, then Mongolia could reduce total national GHG emissions by 27.2%. In addition, actions and measures to remove GHG emissions by forest are determined, which set the total mitigation target of Mongolia at reducing GHG emission by 44.9% by 2030.	N/A
Pakistan	Relative emission reduction	15% (unconditional), 50% (conditional)	Pakistan intends to set an ambitious cumulative aim of conditional and voluntary contributions of an overall reduction of 50% of its projected emissions by 2030, with a 15% drop below BAU using the country's own resources, and an additional 35% drop below BAU subject to international financial support.	Pakistan considers employing the instruments on enhanced ambition provided in Article 6 of the Paris Agreement. This may include the mitigation mechanism under Article 6.4 as well as bilateral cooperative approaches under Article. 6.2. Pakistan may also pilot integrated, holistic and balanced non-market approaches under Article 6.8.

Tajikistan	Absolute emission reduction	30–40% (unconditional), 40–50% (conditional)	The Republic of Tajikistan is committed to an unconditional target of an emissions cap of 60–70% of existing GHG emissions compared to the 1990 level by 2030, which stands at 21.32–24.87 $MtCO_2eq$ by 2030, or 1.9–2.2 tCO_2eq per capita. The conditional target of reducing GHG emissions in the Republic of Tajikistan would have an emissions cap of 50–60% compared to the 1990 level by 2030, which stands at 17.76–21.32 $MtCO_2eq$ by 2030, or 1.5–1.9 tCO_2eq per capita if the international community provides support to the Republic of Tajikistan in terms of finance, technology transfer and capacity-building.	N/A
Turkmenistan	Absolute emission reduction	Stabilization of GHG emissions	Turkmenistan is considering all acceptable development options and submission of INDC and national interests and capabilities of the country, as well as analyzing developed by countries INDCs choose the contribution Type 3 (GHG goal/target), which uses a target indicator attached to per unit of GDP. Specific GHG emissions per unit of GDP are the indicator that can reflect the country's potential to reduce GHG emissions. If financial and technological support is provided by developed countries, Turkmenistan could achieve zero growth in emissions and even reduce them by 2030.	N/A

Uzbekistan	Carbon intensity reduction	35%	The Republic of Uzbekistan has increased its commitments in the updated NDC and intends to reduce specific greenhouse gas emissions per unit of GDP by 35% by 2030 from the 2010 level, instead of the 10% target specified in the NDC1.	N/A

Source: Institute for Global Environmental Strategies (IGES), Nationally Determined Contributions (NDC) database version 7.7.

+86.991.8891151

km@carecinstitute.org | www.carecinstitute.org

21th Floor, Commercial Building Block 8, Vanke Metropolitan,
No. 66 Longteng Road, Shuimogou District,
Xinjiang Uygur Autonomous Region, the People's Republic of China , 830028