Progress and Challenges in Implementing Emission Trading Mechanisms in the CAREC Region

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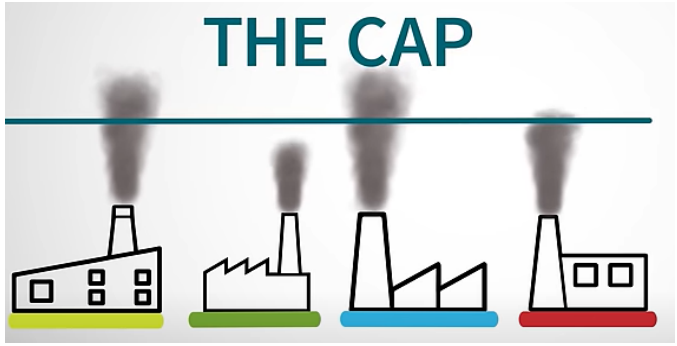
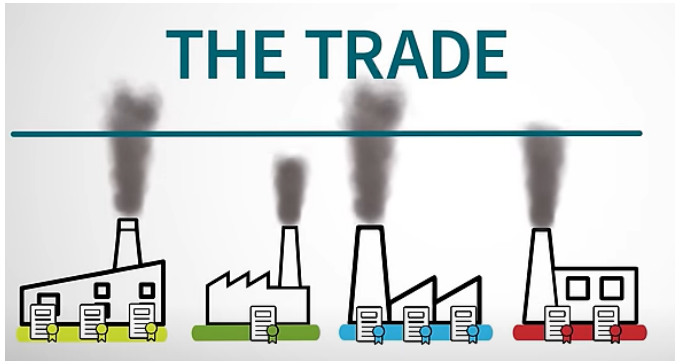
INTRODUCTION

Immediate action needed due to **severe threats** to ecosystems, economies, and societies (Rogelj et al., 2016). Paris Agreement (2015) aims to limit global temperature rise to below **2°C, ideally 1.5°C**. Annual COP meetings drive international collaboration and policy innovation for climate action **SDG 13**





Carbon Pricing Mechanisms

- **Carbon Tax**: Direct tax on carbon emissions, incentivizing reduction at source.
- **Cap-and-Trade (ETS)**: Sets a cap on total emissions, allows trading of emission allowances.

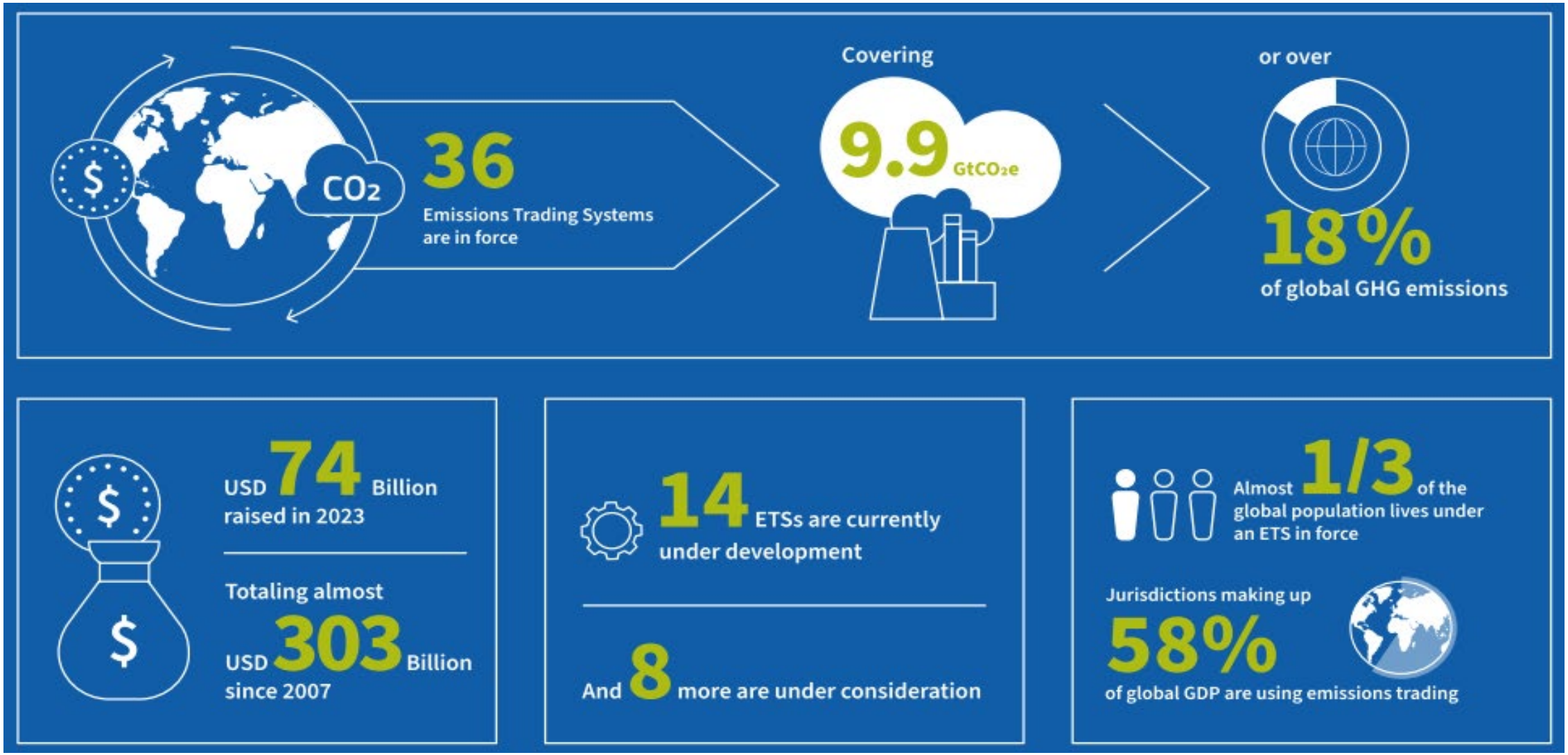
Emission Trading Mechanism (ETM)

- ETM, or cap-and-trade systems, are market-based strategies to limit GHG emissions (Lin & Jia, 2017).
- These mechanisms set a cap on total emissions distribute emission allowances means giving right to emit a certain amount of emissions and allow entities to trade emission allowances to meet compliance (X. Zhang et al., 2020).

Economic Impact, and Environmental Benefits

- Generates revenue, reinvested in green transition projects, supporting economic transformation (W. Cai & Ye, 2022).
- Creates socio-economic impacts towards building green economies.
- ETM drives innovation in high-emitting sectors like power generation, manufacturing, and transportation.
- Encourages the development and adoption of low-carbon technologies.

Emission Trading Overall Progress (in 2023)



Status of Emission Trading in the CAREC

Source: International Carbon Action Partnership (ICAP)

Motivation of the study

Economic Diversity: CAREC countries have varying levels of economic development and financial capabilities.
Sectoral Variations: Different countries rely on different economic sectors, requiring sector-specific adaptations.
Regulatory and Policy Frameworks: Regulatory environments vary, necessitating tailored ETM designs.
Infrastructure Readiness: Infrastructure for monitoring and reporting differs, needing customized support.
Market Maturity: Financial market maturity varies, affecting carbon market liquidity and stability.
Social and Political Contexts: Social acceptance and political support differ, requiring context-specific strategies.

Achieving climate action goals requires a deep understanding of ETMs and the challenges associated with their implementation.

Objective of the Study

The study identifies the challenges through a **comparative analysis** of existing ETMs in the CAREC and other regions. The objective is to analyze the primary challenges hindering ETM implementation and propose strategic approaches, including policy recommendations and capacity-building initiatives, to foster a **conducive market** environment for ETMs in the CAREC region.

METHODOLOGY

Data, Sampling and Analysis Techniques

•Data sourced from various international databases and reports.
•**Purposive sampling** strategy to select countries with active ETMs.
•Selected ETMs include EU (EU ETS), New Zealand, South Korea, China, and Kazakhstan.

Data Analysis Techniques

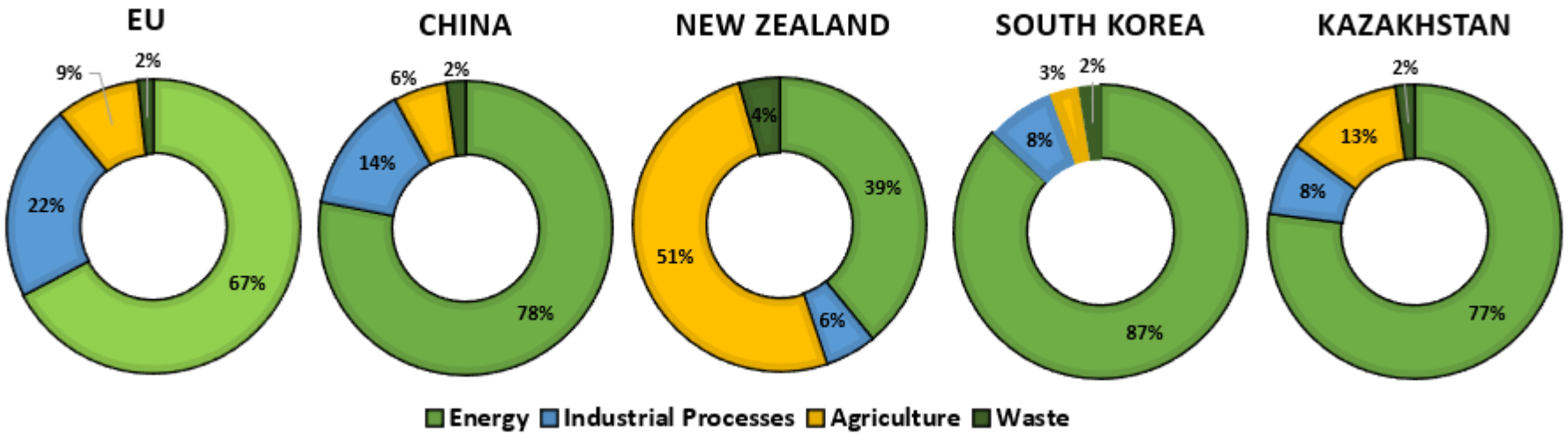
Comparative analysis Compare countries from diverse economic contexts and ETM statuses to facilitate a comprehensive analysis.

Advantages of comparative analysis

•Comparative analysis focuses on adaptability, performance, and challenges of ETMs across different regions.
•Key insights on best practices and common challenges to inform policy recommendations.
•Identifies how regional, financial, economic, and regulatory conditions influence ETM success.
•Empowers stakeholders to refine mechanisms, design efficient new systems, and pursue collaborative regional strategies.

Economic and Emission Overview

Metrics	EU	South Korea	New Zealand	China	Kazakhstan
Economic Size (GDP)	$16.76 trillion	$1.67 trillion	$246.73 billion	$17.88 trillion	$225.5 billion
GDP per capita (Current US$)	$ 37,466.7	$32,394.7	$48,216.5	$12,662.6	$11484.4
Industrial value added (Current US$)	$ 3078.02 billion	$ 493.32 billion	$ 31.34 billion	$ 5503.05 billion	$ 67.02 billion
Carbon Emissions (MtCO2e)	3587.80	725.74	82.72	15684.63	331.53
Carbon Emission per Capita (t CO2eq/cap)	8.09	14.01	16.83	10.95	17.33



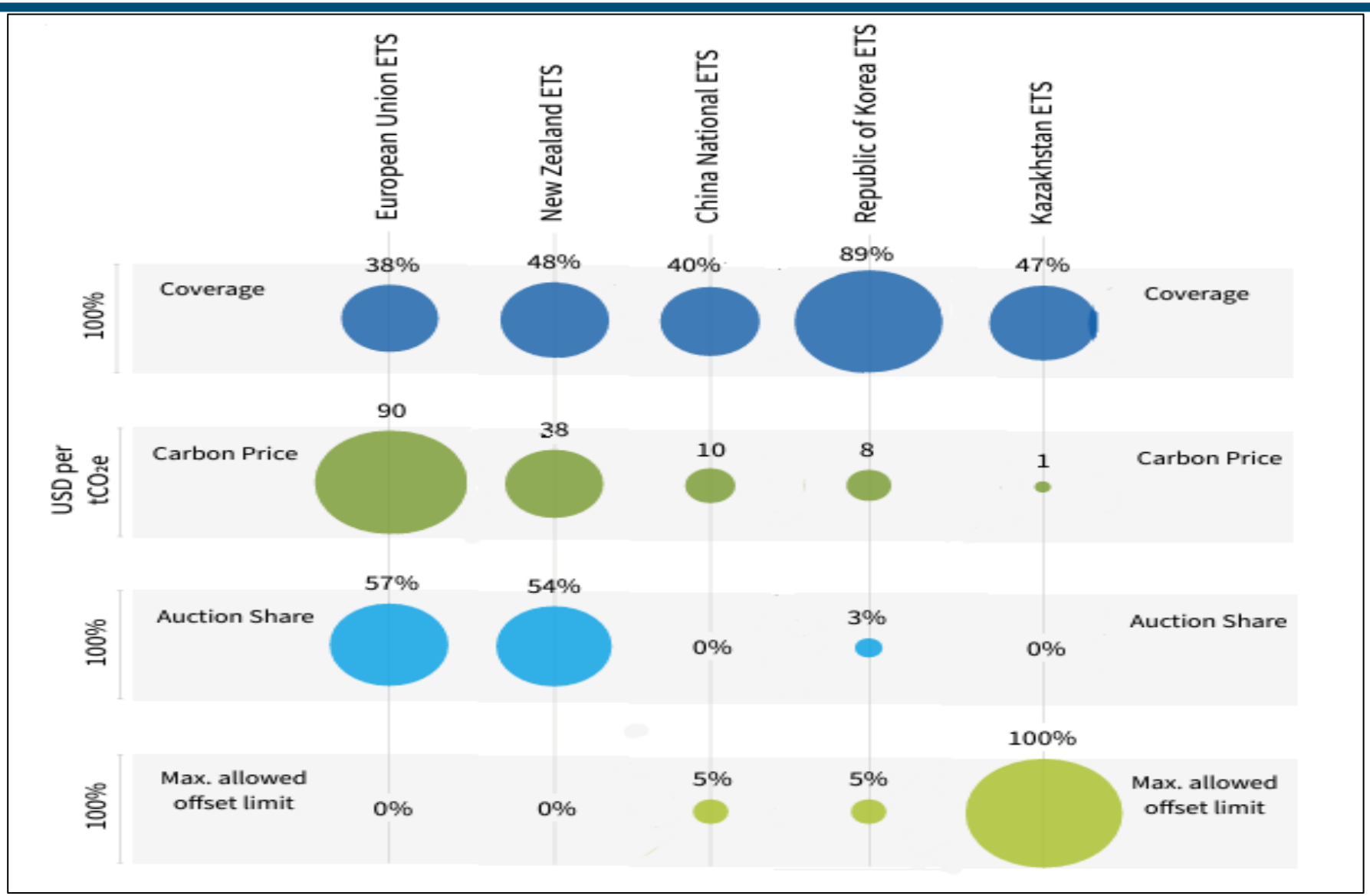
Comparative Analysis of Emission Trading Mechanisms (ETMs)

Main Points	Sub-Points
Success Factors	Total Emissions Covered
	Allowances allocation efficiency
	Compliance Rate
	Total Revenue Generated
Financial Architecture Optimization	Pricing Mechanisms
	Funding and Subsidies
	Access to Green Finance
	Investment in Renewable and Low-Carbon Technologies
Stakeholder Engagement	Awareness and Capacity Building
	Participation Rates
	Feedback Mechanisms
Regulatory Support	Legal Framework
	Alignment with National Policies
	International Cooperation
Technological Infrastructure	MRV Systems
	Trading Platforms
	Innovation Support

Comparative Analysis of Success Factors of ETM

Country	EU ETS	New Zealand ETS	South Korea ETS	China's National ETS	Kazakhstan's ETS
Start of operation (year)	2005	2008	2015	2021	2013
GHGs covered	CO2, HFCs, N2O, PFCs, SF6	CO2, CH4, N2O, SF6, HFCs, and PFCs	CO2, CH4, N2O, HFCs, PFCs, SF6	CO2	CO2
Sectoral coverage	Maritime, Domestic Aviation, Industry, Power	Forestry, Maritime, Waste, Domestic Aviation, Transport, Buildings, Industry, Power	Maritime, Waste, Domestic Aviation, Transport, Buildings, Industry, Power	Power	Industry, Power
Total Emissions Covered in MtCO2e (% of total CO2e)	1,386 (38%)	27.9 (48%)	547.9 (89%)	5000 (40%)	161.2 (47%)
Allocation Efficiency	High Efficiency (Auctioning, Free Allocation)	Moderate Efficiency (Auctioning, Free Allocation)	Moderate Efficiency (Auctioning, Free Allocation)	Moderate Efficiency (Free Allocation Auctioning to be introduced)	Limited-Efficiency (Free Allocation)
Cap formation process	Top-down, Centralized cap.	Bottom-Up - Sector-wide caps	Bottom-Up - Sector-specific caps	Top-Down - Intensity-based	Bottom up Production-based

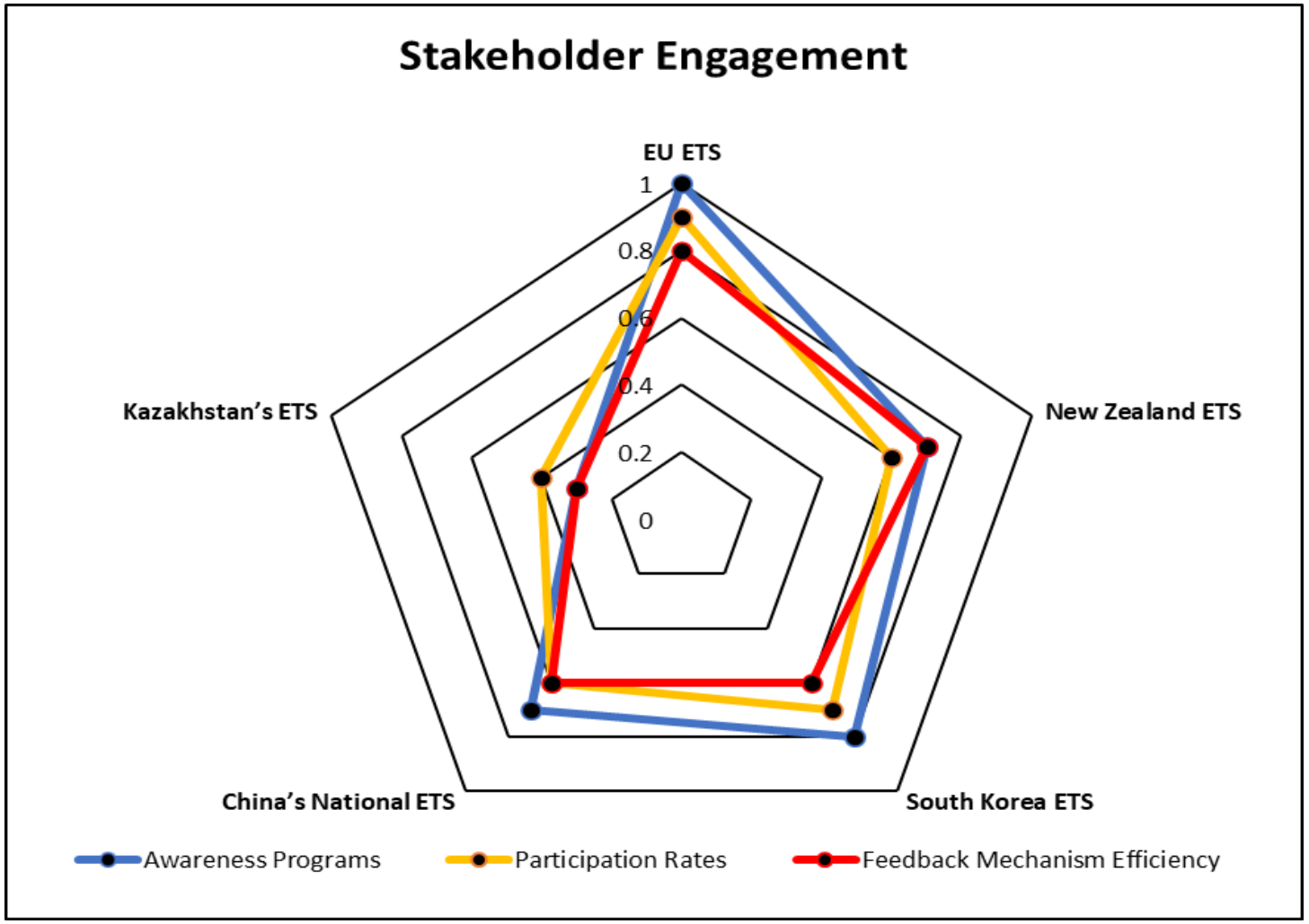
Different dimensions of ETM, Carbon markets key metrics



Financial Architecture Optimization Measures

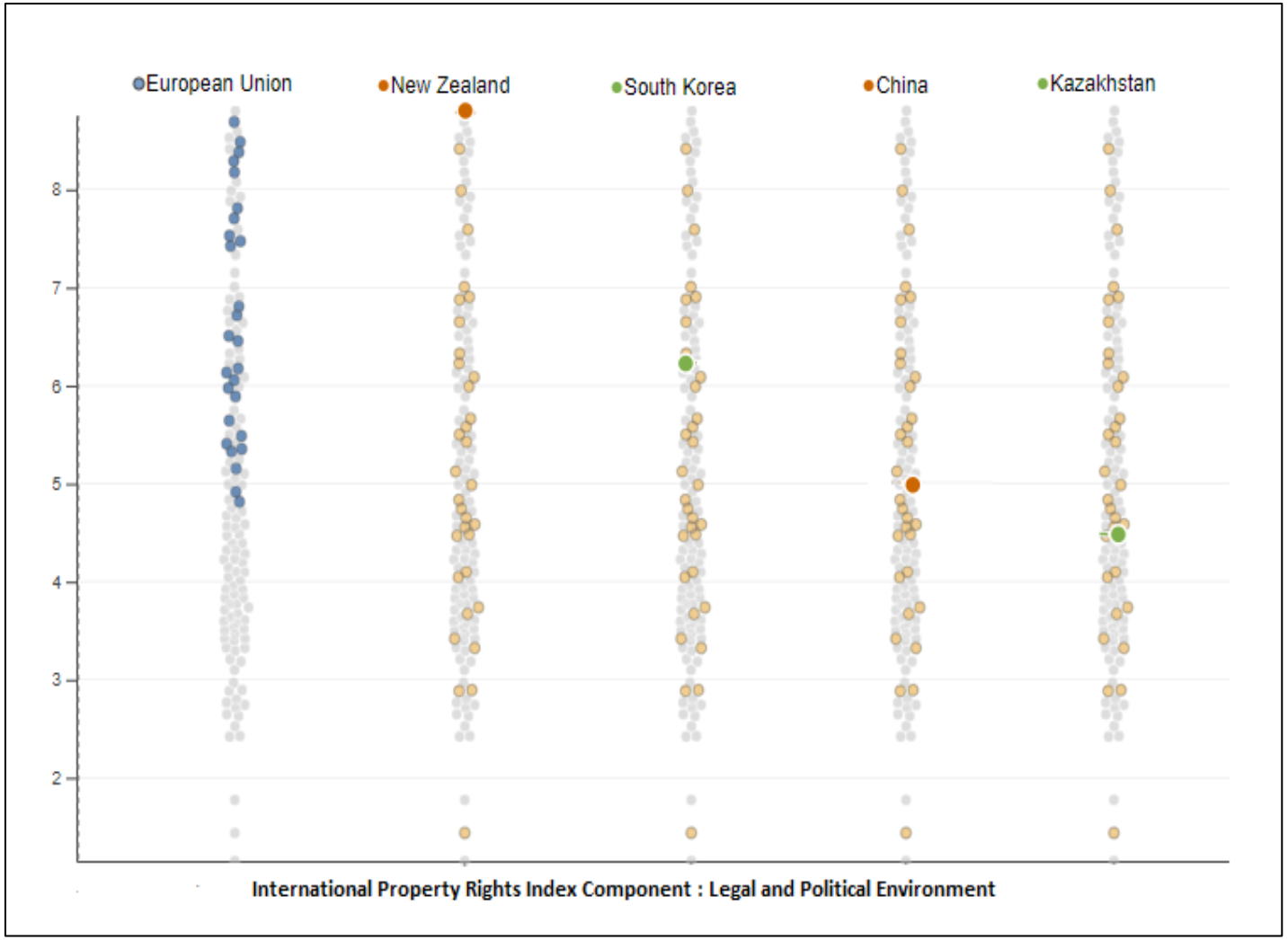
ETM System	EU	New Zealand	South Korea	China	Kazakhstan
Pricing Mechanisms	Fixed and Market-based Auction	Fixed and Market-based	Auction and Market-based	Fixed and Market-based	Fixed
Revenue Generated through ETM ($ M 2022)	42,838	1,406	262	0.0	0.0
Overall Funding and Subsidies in green projects ($ B 2022)	128.88	1.321	3.130	2.260	0.028
Access to Green Finance (Liquidity)	High	Moderate	High	Moderate	Low
Investments in Green Technologies ($ billion) in 2022	180.00	0.300	0.321	546.00	0.337
Revenue Efficiency	High	Moderate	High	Moderate	Low

Stakeholder Engagement



Effective feedback mechanisms ensure that the emission trading mechanism remains transparent, relevant and adaptive to environmental conditions and market changes

Legal and Political Environment to Support ETM



ETM System	Legal Framework Score IPRI (Legal and Political Environment)
EU	4.2-8.2 (4.8-8.7)
New Zealand	7.79 (8.8)
South Korea	6.38 (6.2)
China	5.59 (5.1)
Kazakhstan	4.63 (4.5)

- The high EU and New Zealand scores indicate that the legal environment is conducive to enforcing and sustaining the ETM
- Kazakhstan score, indicating that there is still room to strengthen its legal and political framework

Technological infrastructure

ETM System	MRV Systems	Trading Platforms	Innovation Support ($ million)
EU	Advanced	User-friendly	180,000
New Zealand	Moderate	Reliable	300
South Korea	Advanced	Highly secure	321
China	Basic	Developing	546,000
Kazakhstan	Basic	Developing	337

The effectiveness of an ETM heavily relies on robust technology infrastructure, particularly Monitoring, Reporting, and Verification (MRV) systems and trading platforms.

CONCLUSION

Key Challenges identified

Cap Stringency: Difficulties in setting and maintaining stringent emission caps due to varying economic conditions and emission profiles in the CAREC region.

Market Liquidity: Insufficient market liquidity hampers effective trading and price discovery within the emission trading systems.

Allowances Allocation: Challenges in fair and efficient allocation of emission allowances, leading to market distortions and inefficiencies.

Regulatory and Policy Gaps: Inconsistencies and gaps in regulations and policies create uncertainty and hinder the smooth operation of ETMs.

Market Infrastructure: Inadequate infrastructure, such as trading platforms and data management systems, limits the effectiveness of ETMs.

Stakeholder Awareness and Capacity: Limited awareness and capacity among key stakeholders reduce engagement and compliance with ETM requirements.

Monitoring, Reporting, and Verification (MRV): The absence of robust MRV systems undermines transparency, trust, and accountability in the emission trading process.

Policy Recommendations

- **Expand Sectoral Coverage** add agriculture, transportation, construction, and waste management . Establish a **baseline** for emissions in each sector and evaluate emission reduction potential and economic impacts.
- **Improve Emission Allowance Allocation ,** Transition from **free allocation to auctioning** to enhance efficiency and transparency, Implement a **phased plan** to increase auctioned allowances annually, Introduce **market stability mechanisms** to manage price volatility.
- **Enhance Carbon Pricing :** Gradually increase carbon prices to reflect the true cost of emissions,. **Set an initial floor price** and prepare a multi-year schedule for gradual increases, Adjust carbon prices based on economic conditions like inflation and GDP growth.
- **Strengthen Legislative Framework :** Develop comprehensive laws for ETM operations, trading platforms, and climate change adaptation, Align laws with international best practices and ensure flexibility for market changes, Establish stringent compliance mechanisms, including audits and real-time emissions monitoring.
- **Increase Financial Incentives and Support,** Provide subsidies for investments in green technologies and renewable energy projects, Introduce tax reductions, direct grants, and low-interest loans for green initiatives, Establish green investment funds and promote the issuance of green bonds.
- **Invest in Technology Infrastructure** Develop advanced MRV systems with high-precision sensors and automated data management. Create secure digital trading platforms with real-time data feeds and intuitive user interfaces. Enhance market liquidity and participation by reducing entry costs and complexities.
- **Foster Stakeholder Engagement** Organize workshops, seminars, and consultation forums for feedback and collaboration. Publish regular ETM progress reports and collaborate with NGOs and academia.
- **Promote Market Readiness and International Integration** Harmonize domestic ETM regulations with international standards. Establish bilateral or multilateral agreements for broader market access. Adopt global verification and compliance practices to facilitate integration