8TH CAREC THINK TANK DEVELOPMENT FORUM (CTTDF)

THE CLIMATE CHALLENGE: TNINKING BEYOND BORDERS FOR COLLECTIVE ACTION

27-28 AUGUST 2024,
ALMATY, KAZAKHSTAN

8th CAREC Think Tank Development Forum (CTTDF)

The Climate Challenge: Thinking Beyond Borders for Collective Action

27-28 August 2024 | Almaty, Kazakhstan

ADB

CAREC INSTITUTE

EFSD
EURASIAN FUND FOR STABILIZATION AND DEVELOPMENT

PRC FUND
POVERTY REDUCTION AND REGIONAL COOPERATION FUND

CAUCASUS, CENTRAL ASIA AND MONGOLIA
CCAMTAC REGIONAL CAPACITY DEVELOPMENT CENTER

R | K | S | I
ADB-PRC Regional Knowledge Sharing Initiative

Eurasian Development Bank

Disclaimer:

The report summarizes the proceedings of the Eighth CAREC Think Tank Development Forum, held on 27-28 August, 2024.

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.

This publication is available under the Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO) https://creativecommons.org/licenses/by/3.0/igo/. By using the content of this paper, you agree to be bound by the terms of this license. This CC license does not apply to other copyright materials in this paper. If the material is attributed to another source, please contact the copyright owner or publisher of that source for permission to reproduce it. The CAREC Institute cannot be held liable for any claims that arise as a result of your use of the material.

Central Asia Regional Economic Cooperation (CAREC) Institute
20th-21st Floors, Commercial Building Block 8, Vanke, Metropolitan,
No. 66 Longteng Road, Shuimogou District, Urumqi, Xijiang, the PRC, 830092

F:+86-991-8891151
Linkedin: carec-institute
km@carecinstitute,org
http://www.carecinstitute.org


ugust, 2024
Location: Ritz-Carlton, Almaty, Kazakhs
CAREC
th
Think Tan
The Climate Challenge
Thinking Beyond Borders for Collective Action


Ahmet Yesevi Üniversitesi
Количество аналитических центров в регионе ЦАРЭС
1.000-2.000
CAREC
ERI
Ahmet Yesevi Üniversitesi
The number of think tanks in CAREC Region
1.000-2.000
CAREC

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ACMECS	Ayeyawady–Chao Phraya–Mekong Economic Cooperation Strategy
ADB	Asian Development Bank
AIIB	Asian Infrastructure and Investment Bank
AKDN	Aga Khan Development Network
AMBDC	ASEAN Mekong Basin Development Cooperation
AMRO	ASEAN+3 Macroeconomic Research Office
ARCII	Asia–Pacific Regional Cooperation and Integration Index
ASEAN	Association of Southeast Asian Nations
AWGCC	ASEAN Working Group on Climate Change
BCA	border carbon adjustment
BICFIT	Baku Initiative for Climate Finance, Investment, and Trade
BNAI	Beijing National Accounting Institute
BRI	belt and road initiative
BTBU	Beijing Technology and Business University
CAERC	Center for Analysis of Economic Reforms and Communication
CAREC	Central Asia Regional Economic Cooperation Program
CASISD	Chinese Academy of Sciences Institutes of Science and Development
CBAM	Carbon Border Adjustment Mechanism
CCAMTAC	Caucasus, Central Asia, and Mongolia Regional Capacity Development Center
CCAP	Climate Change Action Plan
CCCV	CAREC Climate Change Vision
CCU	carbon capture and utilization
CEP	core environment program
CGE	computable general equilibrium
CI	CAREC Institute
CIS	Commonwealth of Independent States
CMT	cut-make-trim contract
COP	conference of parties
CPM	carbon pricing mechanism
CPMM	corridor performance measuring and monitoring
CRMs	critical raw materials
CSPFF	CAREC Climate and Sustainability Project Preparatory Fund
CTTDF	CAREC Think Tank Development Forum
CTTN	CAREC Think Tank Network
CWRC	regional cooperation and integration unit
DFI	development finance institution
DMC	developing member country
EBRD	European Bank for Reconstruction and Development
ECOTA	Economic Cooperation Organization Trade Agreement
EDB	Eurasian Development Bank
EFSD	Eurasian Fund for Stabilization and Development
EPA	Environmental Protection Agency
ERG	Eurasian Resources Group
ERI	Eurasian Research Institute
ESG	environmental, social, governance
ESRM	environmental and social risk management
ETI	Energy Transition Index

ETM	Energy Transition Mechanism
ETS	emissions trading system
FAO	Food and Agriculture Organization
FDI	foreign direct investment
FTA	free trade agreement
GALAGC	General Authority for Land Administration, Geodesy, and Cartography
GCC	Gulf Cooperation Council region
GCF	Green Climate Fund
GDP	gross domestic product
GEF	Global Environment Facility
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	greenhouse gas
GIAHS	Globally Important Agricultural Heritage Systems
GMS	Greater Mekong Subregion
GMS Program	GMS Economic Cooperation Program
GVC	global value chain
HadGEM	Hadley Centre Global Environment Model
IAI	Initiative for ASEAN Integration
ICMA	International Capital Market Association
IMF	International Monetary Fund
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
IPRS	industrial park rating system
IRIMHE	Institute of Regional Innovation and Multi-Hazard Engineering
IsDB	Islamic Development Bank
ISET	International School of Economics at Tbilisi State University
IWMI	International Water Management Institute
JETP	just energy transition partnership
KAZ	Kazakhstan
KGZ	Kyrgyzstan
LDCs	least developed countries
LMC	Lancang–Mekong Cooperation
MCF	multilateral climate fund
MDB	multilateral development bank
MENR	Ministry of Ecology and Natural Resources
MI	Mekong Institute
MIC	Made-in-China
MLEC	Mekong–Lancang Environmental Cooperation
MOFALI	Ministry of Food, Agriculture, and Light Industry
MRC	Mekong River Commission
MRV	monitoring, reporting, and verification
NAMEM	National Agency for Meteorology and Environmental Monitoring
NDC	nationally determined contribution
NEMA	National Emergency Management Agency
NGFS	Network for Greening the Financial System
NTMs	non-tariff measures
NUPI	Norwegian Institute of International Affairs
NZBA	Net Zero Banking Alliance
OECD	Organisation for Economic Cooperation and Development
PAK	Pakistan

PFM	public financial management
PRI	Principles for Responsible Investment
PUG	pasture user group
RES	renewable electricity source
RGP	Research Grants Program
RTA	regional trade agreement
SAARES	State Agency for Alternative and Renewable Energy Sources
SDC	Swiss Agency for Development and Cooperation
SDG	Sustainable Development Goal
SDPI	Sustainable Development Policy Institute
SHAKTI	sustainable holistic approach and knowledge for trade infrastructure
SIDS	Small Island Developing States
SLB	sustainability-linked bond
SME	small and medium-size enterprise
SPS	sanitary and phytosanitary
TAJ	Tajikistan
TIIAME	Tashkent Institute of Irrigation and Agricultural Mechanization Engineers
TCI	trade complementarity index
TCO	total cost of ownership
ToR	terms of reference
UN	United Nations
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WGCC	Working Group on Climate Change
WTO	World Trade Organisation

DAY ONE

SESSION I: OPENING CEREMONY

Welcome remarks by Mr Kabir Jurazoda, Director, CAREC Institute

Good morning, dear excellencies, esteemed guests, participants, ladies, and gentlemen,

It is a great pleasure to welcome you to the eighth Central Asia Regional Economic Cooperation Program (CAREC) Think Tank Development Forum (CTTDF).

We gather here today amid profound socioeconomic and technological shifts, alongside the pressing challenge of accelerated climate change. This forum is centered on the crucial themes of climate change adaptation and mitigation. The World Meteorological Organization has recently reported that the last decade has seen the ten warmest years in the past 174 years. This unprecedented rise in temperature has led to severe weather events—heatwaves, floods, droughts, wildfires, and tropical cyclones—that have impacted millions of lives and resulted in billions of dollars in economic losses, including within the CAREC region.

Over the next two days, we will explore actionable solutions, discuss cooperative strategies between our countries, and determine the role that think tanks can play in this vital effort. Our context-setting session will delve into the effectiveness of global climate initiatives such as the Paris Agreement, the Global Environment Facility, and the Green Climate Fund. We will evaluate how these multilateral platforms can aid in mitigating climate change.

Following this, our focus will shift to the perspectives of Asian subregions in combating climate change. This provides a valuable opportunity to compare strategies and initiatives between ASEAN, the Greater Mekong Subregion (GMS), and the CAREC region.

We will also hear findings from research papers funded by the CAREC Think Tanks Network (CTTN) Research Grants Program (RGP). This session will not only be insightful but will also strengthen collaborative research among CAREC think tanks and the broader research community.

A session dedicated to green innovation will highlight the pivotal role of technology in both adapting to and mitigating climate change. We will then review in detail the strategies adopted by CAREC countries; however, strategies alone are not enough.

Effective implementation requires adequate financing. We need increased development finance, greater private climate investment, and adjustments to fiscal and subsidy policies within CAREC countries. One of our sessions will specifically address these critical financial aspects.

In the final segments of the forum, we will engage in discussions about the challenges faced by think tanks, including navigating regulatory environments, managing stakeholder interests, and fostering institutional growth. We will also explore ways to enhance collaboration among think tanks. The forum will conclude with a report on the progress made by CTTN.

Thank you all for being here, and let’s look forward to a productive and impactful forum.

Opening address by Mr Yang Yingming, Vice President, Asian Development Bank, Manila, Philippines

Good morning, distinguished guests, ladies, and gentlemen,

It is with great pleasure that I welcome you to the eighth CTTDF. This year, we gather in the vibrant city of Almaty to engage in vital discussions that will help shape the future of our region.

The Asian Development Bank (ADB) has been a steadfast supporter of CI since its inception, particularly in three key areas: (i) aligning the CAREC Institute's institutional strategy and programs with CAREC strategies, most notably the CAREC 2030 Strategy; (ii) building the institute's capacity across all stages of operations, including enhancing analytical capabilities, financial sustainability, knowledge management, training, capacity development, outreach, and communications; and (iii) supporting the implementation of CI activities through program design, technical support, and co-financing.

This aligns with the annual CTTDF, organized under the auspices of the CTTN. Each year, the forum convenes leading practitioners from think tanks, multilateral development partners, governments, and the private sector within the CAREC region. Together, participants brainstorm regional challenges and provide diverse perspectives and innovative solutions through experience sharing and knowledge collaboration.

Against this backdrop, the theme of this year's forum, 'The Climate Challenge: Thinking Beyond Borders for Collective Action,' is particularly timely. As we witness the increasing impacts of climate change, it is crucial that we unite to share our experiences, challenges, and successes.

How is ADB supporting CAREC countries in their efforts to tackle the climate challenge?

ADB's mission is to foster prosperity, inclusivity, resilience, and sustainability across Asia and the Pacific. This commitment is evident in several initiatives, including (i) the adoption of the CAREC Climate Vision, (ii) the establishment of the CAREC Working Group on Climate Change, and (iii) the forthcoming CAREC Climate Action Plan, which will be approved this year.

In response to the identified climate financing gaps within these countries, we are advancing the CAREC Climate and Sustainability Project Preparatory Fund, supported by ADB and contributions from various multilateral and bilateral sources.

How can think tanks contribute to mitigating and adapting to the impacts of climate change?

As knowledge producers with strong connections to policymakers and grassroots communities, think tanks play a pivotal role in leveraging big data to inform evidence-based policymaking. Through rigorous analysis, you can evaluate the socioeconomic impacts of national and regional policies and propose necessary adjustments to achieve more favorable outcomes.

Think tanks can assist in designing nationally determined contributions and national climate change action plans. Additionally, they are well-positioned to look beyond national boundaries, viewing climate change as a shared existential threat to the entire region.

I would like to express my gratitude to CI and its partners for organizing this significant event. The CAREC Program has been instrumental in fostering regional cooperation and development, and this forum is a testament to our collective commitment to a sustainable future.

Over the next two days, you will hear from a diverse group of thinkers, policymakers, and practitioners. Your insights and contributions are invaluable as we work to advance our climate agenda and achieve the United Nations (UN) Sustainable Development Goals (SDGs).

Let us seize this opportunity to collaborate, learn from one another, and build partnerships that will endure beyond this forum. Together, we can ensure a sustainable, resilient, and prosperous future for the CAREC region.

Thank you, and I wish you fruitful discussions ahead!

Keynote address by Ms Assel Sarsenbayeva, Chairperson of the Management Board, Economic Research Institute, Member of the Board of Directors, Ministry of National Economy, Kazakhstan

Dear ladies and gentlemen, forum participants!

I am pleased to welcome you to today's meeting and wish all participants productive work! It is a great honor for me to take part in the opening of the forum, as cooperation in the Central Asian region holds significant importance for the sustainable economic development, stability, and prosperity of the participating countries. Central Asian countries possess rich natural resources, a strategic geographical location, and cultural connections.

In this context, cooperation within the framework of CAREC plays one of the key roles in our joint efforts. This interaction not only allows us to share knowledge and experience but also enables us to create unique multilateral approaches to solving complex issues.

Therefore, it is crucial that today's forum focuses on climate challenges and collective action. I notice that the forum sessions cover a wide range of topics, from the effectiveness of global climate initiatives to strengthening multilateral cooperation and developing economically sustainable strategies. Each session aims to deepen our understanding of current challenges and suggest solutions.

Kazakhstan, like many other countries, faces significant climate challenges that require proactive measures and adaptation. Our participation in this forum highlights the country's commitment to pursuing sustainable development, actively implementing green technologies, and reducing its carbon footprint.

The global issue of climate change presents Kazakhstan with challenges in two main areas: the need both for internal adaptation to the effects of climate change and to respond to increasing external climate constraints.

In this regard, Kazakhstan has launched comprehensive climate actions by adopting an ambitious strategy to achieve carbon neutrality by 2060. This strategy serves as a high-level planning document, outlining the need for large-scale economic, technological, and social transformations.

Currently, the Economic Research Institute is developing a draft roadmap for this strategy. This integrated and effective action plan aims to reduce greenhouse gas (GHG) emissions, adapt to changing conditions, and ensure sustainable development.

In addition, Kazakhstan is actively developing and updating a number of key 'green' documents that will become an integral part of the national climate policy, including the 'Concept of the Green Economy of the Republic of Kazakhstan' (adopted in 2013, updated in June 2024), the 'Concept of Hydrogen Energy Development' (developed, at the stage of public discussion), and a 'Plan for the Adaptation of Agriculture to Climate Change (developed, at the stage of coordination with state authorities).

Kazakhstan actively supports renewable energy projects through guaranteed electricity purchases, indexing fixed tariffs and auction prices, reserving land plots, providing financial support, and other measures. These efforts have increased the share of green electricity to 6.47 percent of the total volume by the end of the first quarter of 2024. We plan to launch six additional renewable energy projects by the end of 2024. By 2035, according to the 'Action Plan for the Development of the Power Sector,' renewable energy sources such as solar, wind, hydropower, and biogas will supply 24.4 percent of Kazakhstan's electricity.

ADB’s Energy Transition Mechanism is also actively advancing. It is currently evaluating strategies to accelerate the decommissioning of coal-fired and other fossil-fuel power plants in Kazakhstan as well as exploring ways to replace or repurpose these facilities for clean energy.

The revised pricing schemes in several sectors—including electricity and heat energy, as well as waste collection and sorting—will significantly update municipal infrastructure. These changes will create a more resilient resource distribution system that considers environmental aspects and encourages a reduction in carbon emissions.

Moreover, to promote the adoption of green technologies and ensure effective financial support, authorities have established a green taxonomy for the environmental assessment of green projects. The state support mechanisms will apply to projects outlined in the green taxonomy, including green loans and green bonds.

Efforts are actively under way to integrate Kazakhstan’s emissions trading system with the European system. This integration will stimulate domestic reductions in GHG emissions to meet commitments under the Paris Agreement, recalculate coefficients based on European methodologies, gradually implement paid emissions quota allocations, and improve the quality of carbon reporting verification.

Given the European Union's introduction of the cross-border carbon regulation mechanism, export companies are exploring opportunities to develop the low-carbon sector through decarbonization projects, alternative energy initiatives, and trading in GHG emission certificates. To adopt the best available technologies, experts are developing reference books for the mining, metallurgical, oil refining, energy, chemical, and cement industries.

Overall, Kazakhstan is building a comprehensive carbon regulation system as a key element in the transition to carbon neutrality. This system will include an emissions trading scheme; mechanisms to influence emissions reductions from non-covered economic sectors; climate projects; monitoring, reporting, and verification systems; a green taxonomy; green financing; green procurement; best available technologies; and a unified digital carbon regulation ecosystem. In developing a comprehensive approach to sustainable development, Kazakhstan places special emphasis on ESG (environmental, social, governance) topics. Companies in Kazakhstan are actively implementing ESG standards.

Kazakhstan is integrating ESG principles into the country’s financial market. Regulations will stimulate financial organizations to embrace sustainable development. By redistributing financial resources towards sustainable projects, these measures will enhance investment attractiveness and foster the growth of corporate, social, and environmental responsibility. Thus, Kazakhstan is pursuing an extensive policy that addresses significant issues within the climate agenda.

Moreover, Kazakhstan acknowledges the critical importance and necessity of cooperation, as well as the exchange of expertise and knowledge among analytical centers. At the same time, the scientific value of collaborative efforts is significant, prompting Kazakhstan to actively support and engage with CAREC initiatives aimed at enhancing interaction among analytical centers. Collaboration between our centers can help to identify common directions and develop solutions to relevant issues through a scientific approach. Only through collaborative research and the exchange of expertise, can we achieve a common understanding and foster productive cooperation between our countries across various fields.

In this sense, our institute is open to practical solutions and joint research. To support collaborative efforts, we offer our organization as a dedicated venue for meetings, seminars, and discussions, providing an ideal platform for colleagues from analytical centers to engage and share insights.

Thank you once again for the invitation. I wish you a productive and successful time at the forum!


CAREC
th
Think Tank
The Climate Challenge
Thinking Beyond Borders for Collective Action

SESSION II: CONTEXT SETTING

The first topic explored the effectiveness of global climate initiatives—such as the Paris Agreement, Global Environment Facility (GEF), and Green Climate Fund (GCF)—in mitigating climate change. It explored the progress, challenges, and impact of reducing GHG emissions and adapting to climate change. The second topic focused on fostering greater cooperation and collaboration among multiple stakeholders. Discussions centered around the role of multilateral platforms—such as the United Nations Framework Convention on Climate Change (UNFCCC)—in facilitating dialog, negotiations, and the implementation of climate agreements; strategies to overcome political barriers and enhance trust and solidarity among countries with differing interests; and how to make these platforms inclusive and responsive to the needs of all stakeholders. The third topic explored the choices, strategies, and policy frameworks available to developing economies to pursue growth without compromising the environment. The topic also aimed to identify synergies between economic development and sustainability goals—such as investing in renewable energy, promoting energy efficiency, and adopting green technologies—and the role of international cooperation, technology transfer, and capacity-building support in facilitating sustainable development pathways for low-income countries with limited fiscal resources. In this moderated session, the speakers made presentations (15 minutes each) on their respective topics, and the moderator led and facilitated the discussion (25 minutes) by inviting questions, comments, and participant feedback.

***Moderator**: Lyaziza Sabyrova, Regional Head, Regional Cooperation and Integration, ADB*

The CAREC Climate Change Vision (CCCV) was adopted last year and ADB worked very closely with countries and researchers to develop this document. ADB is now working with CAREC to implement this. In this context, there are also many other global initiatives and this is what the session is about. Under the CAREC Program, we are also developing another facility—the CAREC Climate and Sustainability Preparatory Fund—which is essentially a trust fund.

Assessing the impact of climate initiatives: progress, pitfalls, and lessons learned

***Speaker**: Johannes F Linn, Non-Resident Senior Fellow, Global Economy and Development Program, Brookings Institution, Washington DC, United States*

Money, politics, and impact are three major challenges. There is a dramatic financing gap to respond to urgent climate needs. Investment needs are estimated to be about USD 1.3 trillion but we have only about USD 300 billion currently invested in these countries. By 2030, investment requirements are expected to rise by USD 3.5 trillion. There must be a focus on resource mobilization; however, resources may not be available at the level that is required. Most climate change action and investment are linked to local and regional public goods. We know that the financing of public goods is a tricky business as it requires taxation, which is very difficult to institute politically. Without taxation, financing will be an issue. Another problem is a breakdown in the global climate financial architecture. There are more than 80 international funds, which means that at the country level there is an overlap of coordination and difficulty in accessing these resources. Another issue related to financing is politics; at the national level, climate action requires consistent policy and institutional reform. We tend to look at the winners, but we often forget those that lose out because they are the ones that will inform the way we address challenges. National political challenges are significant but this needs more analysis. At the international level, we have tensions between developing and industrial countries and the way in which they want to use resources. International funders recognize this and decentralize their operations. Finally, there is a big debate between mitigation vs adaptation. When it comes to the replenishment of international climate funds or the establishment of new funds, there is a lot of debate and tension emanating at international level. We see this happening with the

fund for loss and damages. There is also an impact challenge: does climate action address long-term sustainable change? Money alone will not do the trick; we must also consider how it is being invested. We risk making the same mistakes we have made in development finance—namely, how these solutions are implemented. We cannot have one-off projects that result in longer-term solutions; indeed, international funders prefer to go it alone. We tend to be focused on short-term wins rather than long-term investments.

Three responses. There has to be a focus on impact at scale, climate action at the regional level, and the effective utilization of the capacity of think tanks. To achieve the ambitious climate goals, we need to go beyond pilots, innovation, and one-off projects and focus on long-term impacts that are sustainable and scalable. Long-term impact at scale comes through long-term goals, beyond innovation and diffusion and how a project supports a longer-term pathway. We need to develop effective long-term partnerships and incentives at national and international level. Finally, in evaluation, we must check whether we are creating the conditions for long-term impact at scale. We need to be not just enforcers but rather act as intermediaries that support scale explicitly. The good news is that some of this is already happening; I am happy to say that international institutions are very much focused on these long-term impact scale objectives.

Regional action: At the regional level we can forge better and more easily aligned action than we can at the global level. It really is important that we respond to the climate challenge regionally.

Think tanks: Think tanks need to inform and support policy stakeholders regionally and nationally by focusing on scalable solutions through assessment and monitoring. Furthermore, think tanks need to focus on systems change and how to design and implement it by looking at winners and losers in the climate action arena. I hope CI will forge a close relationship with the working group on climate change in supporting research and capacity building. CI has an important role in linking up not only regional think tanks but also within international research and the international think tank community. CI and, more generally, think tanks have a very important role to play in forging solutions and leading the way forward.

Climate change, and adaption and mitigation technologies, call for focused think tank cooperation

***Speaker**: Hans Holzhacker, CAREC Institute*

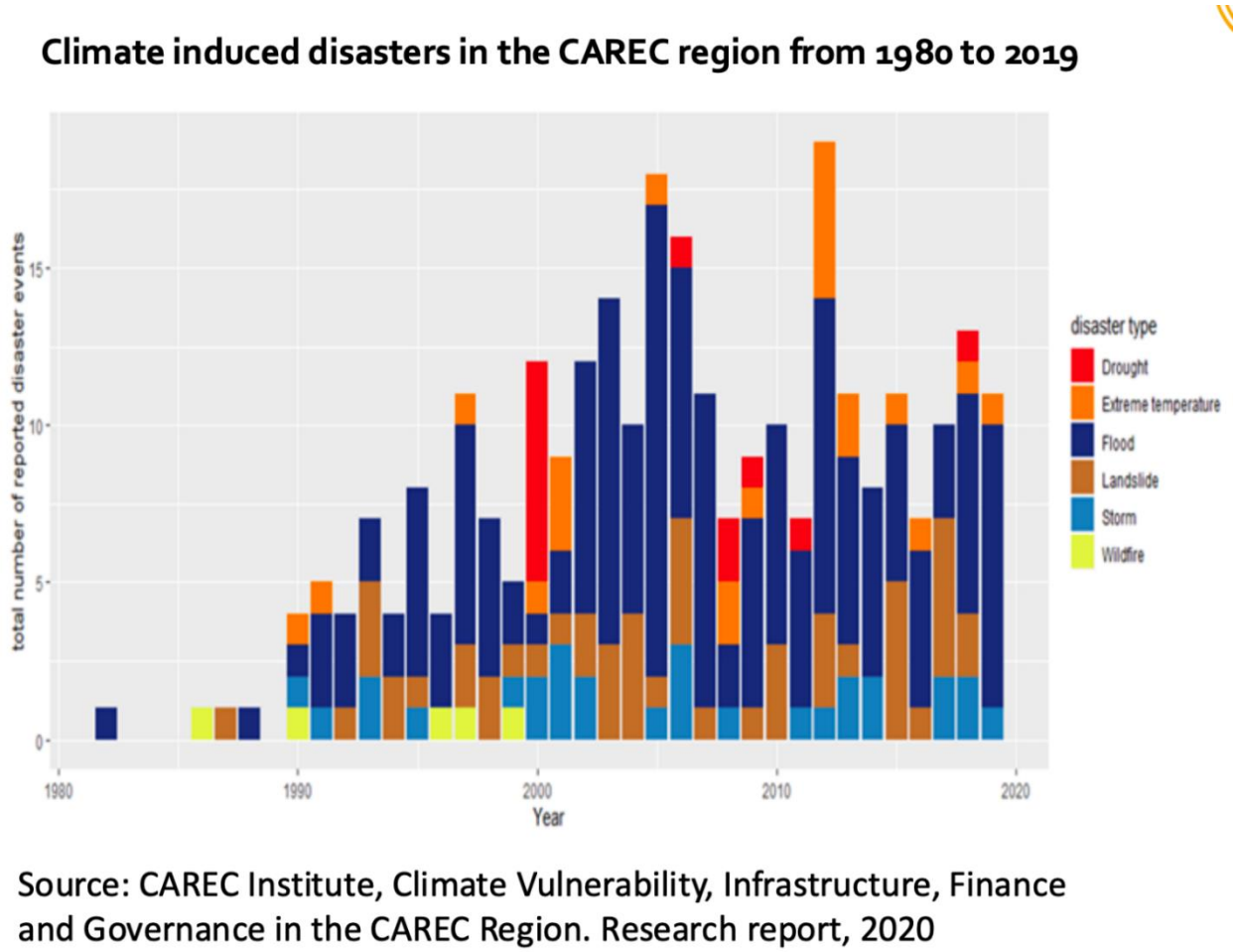
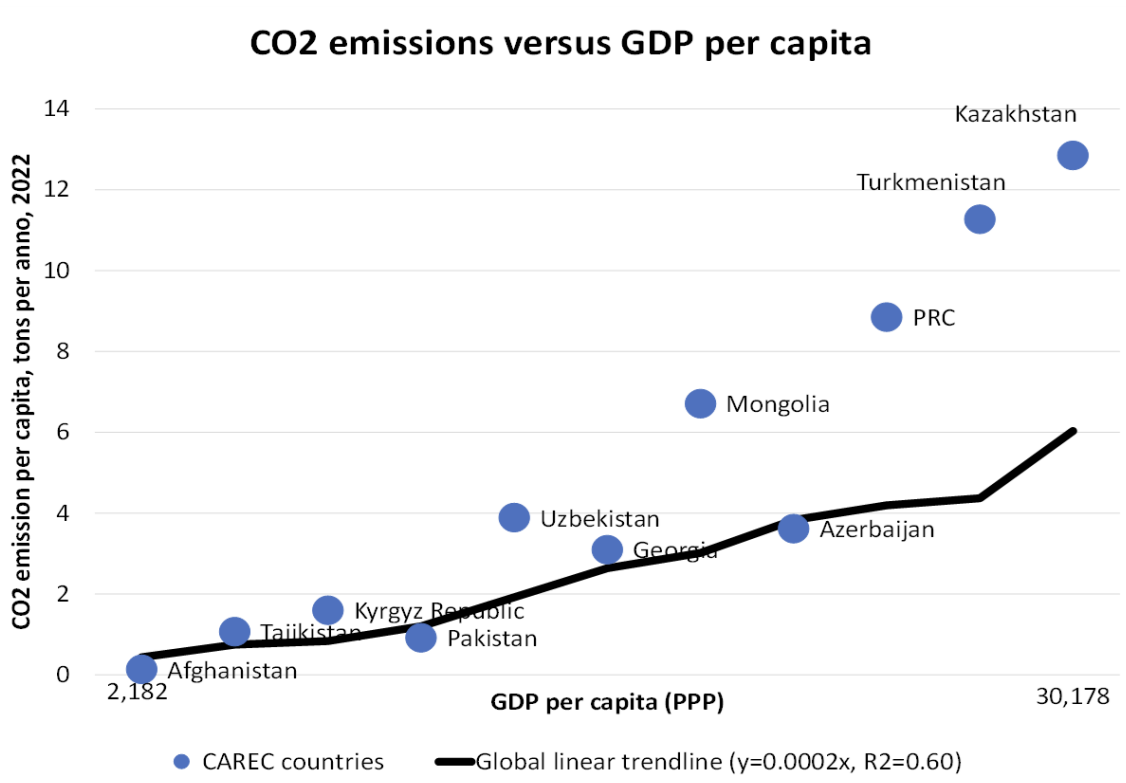


Figure 1: Climate disasters in CAREC countries, 1980-2019

The CAREC region is heavily impacted by climate change, which has resulted in an increase in climate disasters. Figure 1 illustrates the increase in the incidence of climate-induced disasters in the CAREC region from 1980 to 2019. It should also be noted that there is a high incidence of flooding in the CAREC region. Climate change is a serious issue for this region and more so now than at any point before.

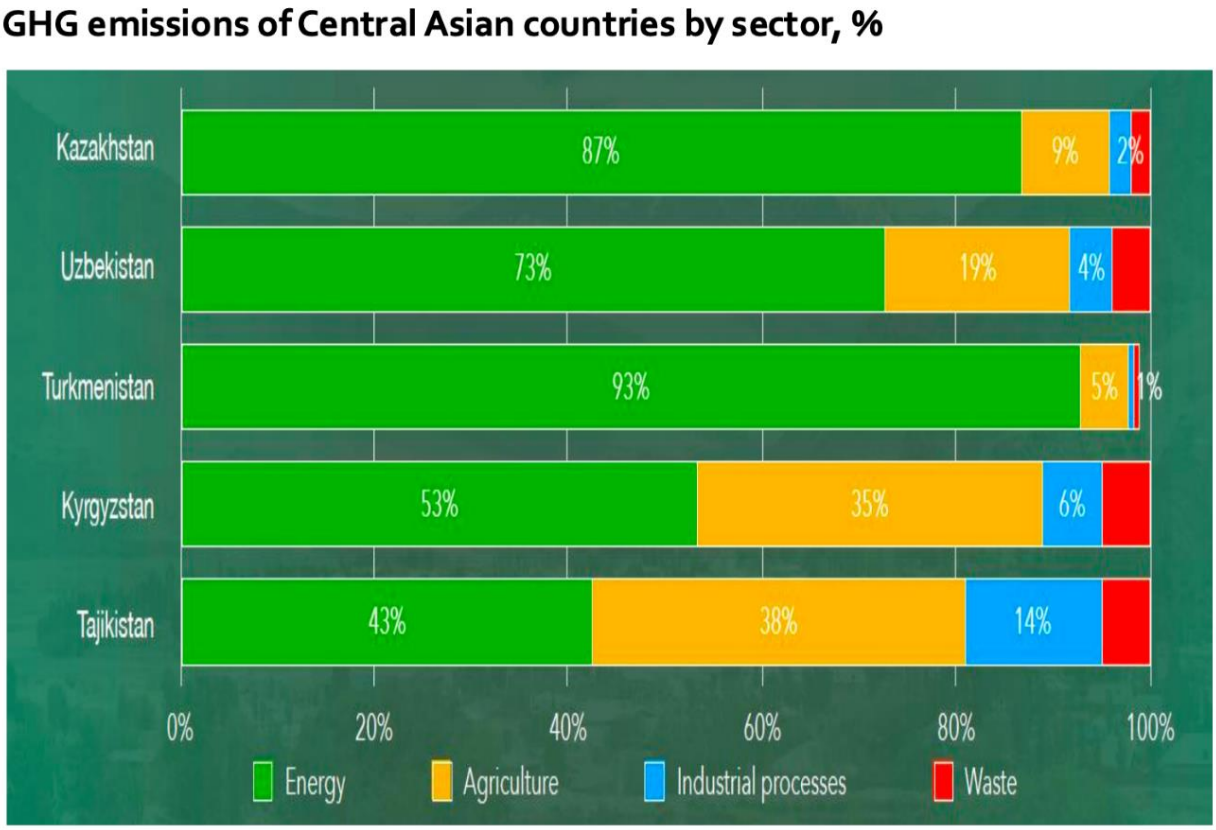


Source: Emissions Database for Global Atmospheric Research (EDGAR), national statistics agencies, calculations and chart by the author

3

Figure 2: CO2 emissions of CAREC countries against GDP per capita

Countries of the CAREC region also contribute to GHG emissions: Mongolia, the PRC, Turkmenistan, and Kazakhstan emit significantly more CO_2 per unit of GDP than the world on average. The black line in Figure 2, which plots CO_2 emissions versus GDP per capita, is a regression line and most CAREC countries are on/below this but certain countries are well above the black line, emitting more CO_2 per unit of GDP.



Source: AIFC, GIP, State of Sustainable Finance in Central Asia, Astana 2024

Figure 3: GHG emissions of selected countries by sector

Figure 3 illustrates GHG emissions of Central Asian countries by sector. The sectors emitting the most are energy and agriculture; therefore, policymakers should focus on these sectors. There is a new wave of green electrification in the CAREC region, with many new projects and initiatives under way, but many more will be needed. A few notably active companies in the region are as follows:

- ACWA Power of Saudi Arabia
- Masdar (Abu Dhabi Future Energy Company) of the United Arab Emirates (UAE)
- Total Eren of France
- Voltalia of France
- Gezhouba Group Company of China
- Tepelen Group AG of Switzerland
- Powerchina International launched the construction of a 400 MW photovoltaic (PV) power plant in Andijan in the Fergana Valley on 13 September 2023

Energy Transition Index (ETI)

Rank	Name	ETI	System Performance	Transition Readiness
17	PRC	64.9	65.0	64.8
32	Azerbaijan	62.0	69.6	50.7
62	Georgia	54.8	64.0	41.0
73	Tajikistan	53.6	66.4	34.4
76	Kazakhstan	53.0	61.1	40.9
91	Kyrgyzstan	50.6	61.7	34.1
107	Pakistan	46.9	55.2	34.5
111	Mongolia	45.4	56.3	29.0
	Global average	**56.4**	**63.1**	**46.4**

Source: World Economic Forum, Global Energy Transition Index 2023

Table 1: ETI ratings of CAREC countries

Table 1 gives details about the energy transition readiness of CAREC countries by providing a score from 1 to 100. The energy system performance scores are still only average or below throughout the CAREC region on the World Economic Forum's ETI, and the transition readiness scores for most CAREC countries remain significantly below the global average.

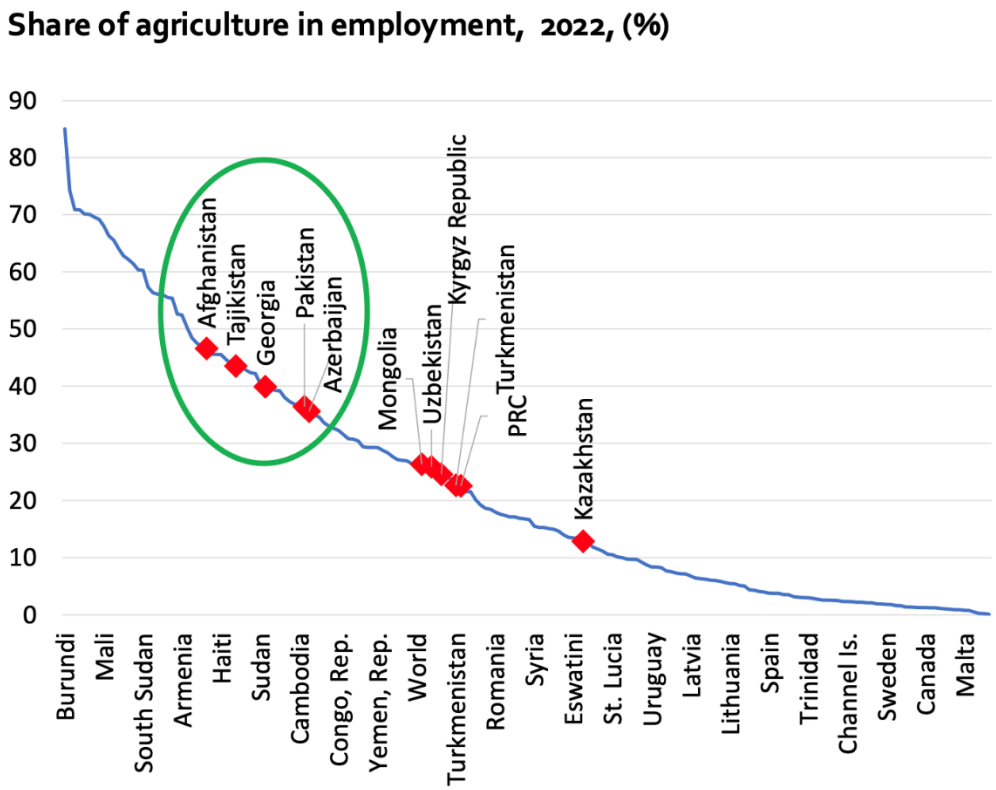


Figure 4: Percentage of workforce employed in agriculture by country, 2022

A great deal is going on in the energy sector. The ETI shows your readiness. Another thing to note is that agriculture is strongly affected by climate change—mostly adversely. Figure 4 shows that in five CAREC countries—Pakistan, Azerbaijan, Georgia, Tajikistan, and Afghanistan—employment in agriculture still accounts for about a third of the population. Moving forward, as the effects of climate change worsen, this statistic will be of increasing concern for such countries and work needs to be carried out to mitigate or soften the inevitable negative outcomes. In order to cope with climate change the CAREC region needs technology.

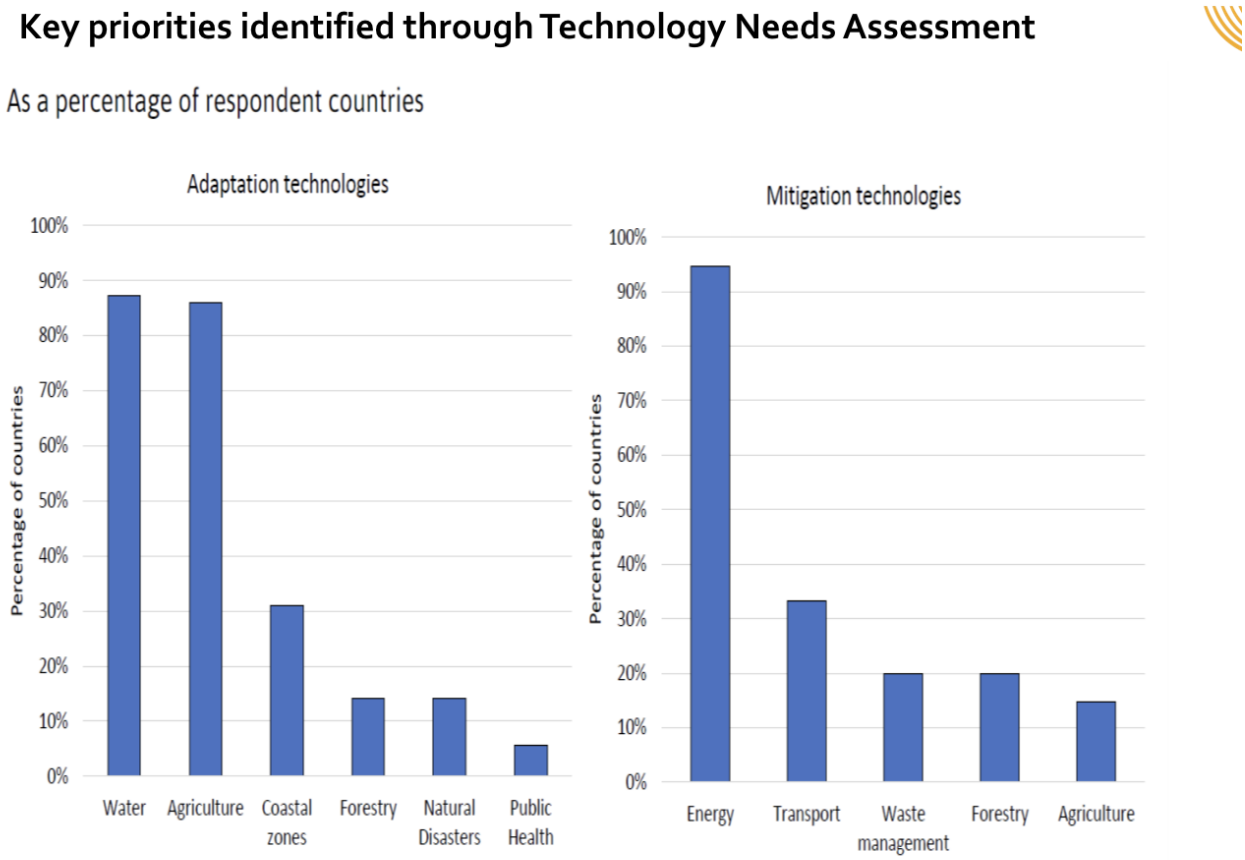


Figure 5: Key technology priorities: adaptation and mitigation, UNEP 2022

The United Nations Environmental Programmer's (UNEP's) global Technology Needs Assessment is an indicator that can be used to look at what the CAREC region needs. The key priorities identified through this needs assessment (see Figure 5) for adaptation technologies are in the water and agricultural sectors and for mitigation technologies are in the energy and transport sectors.

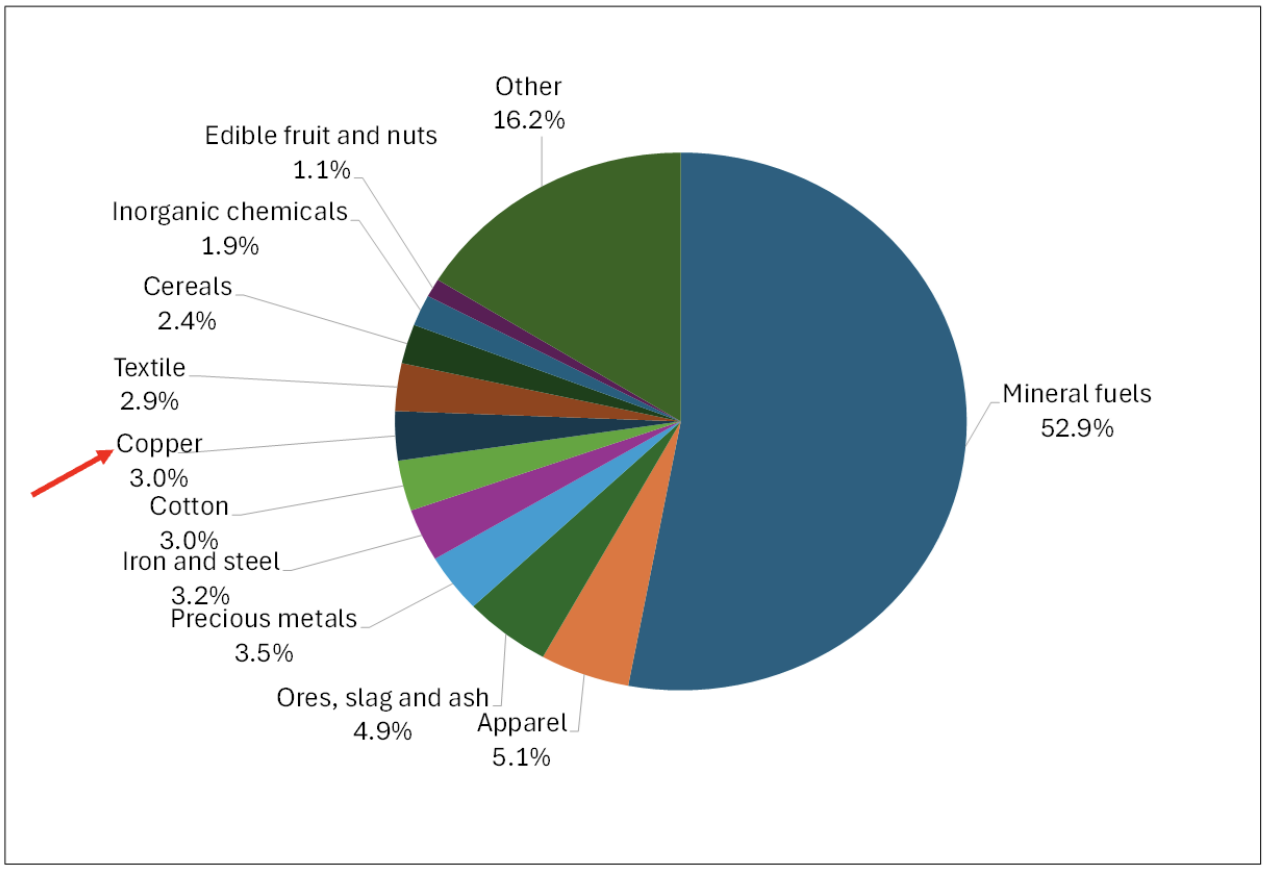
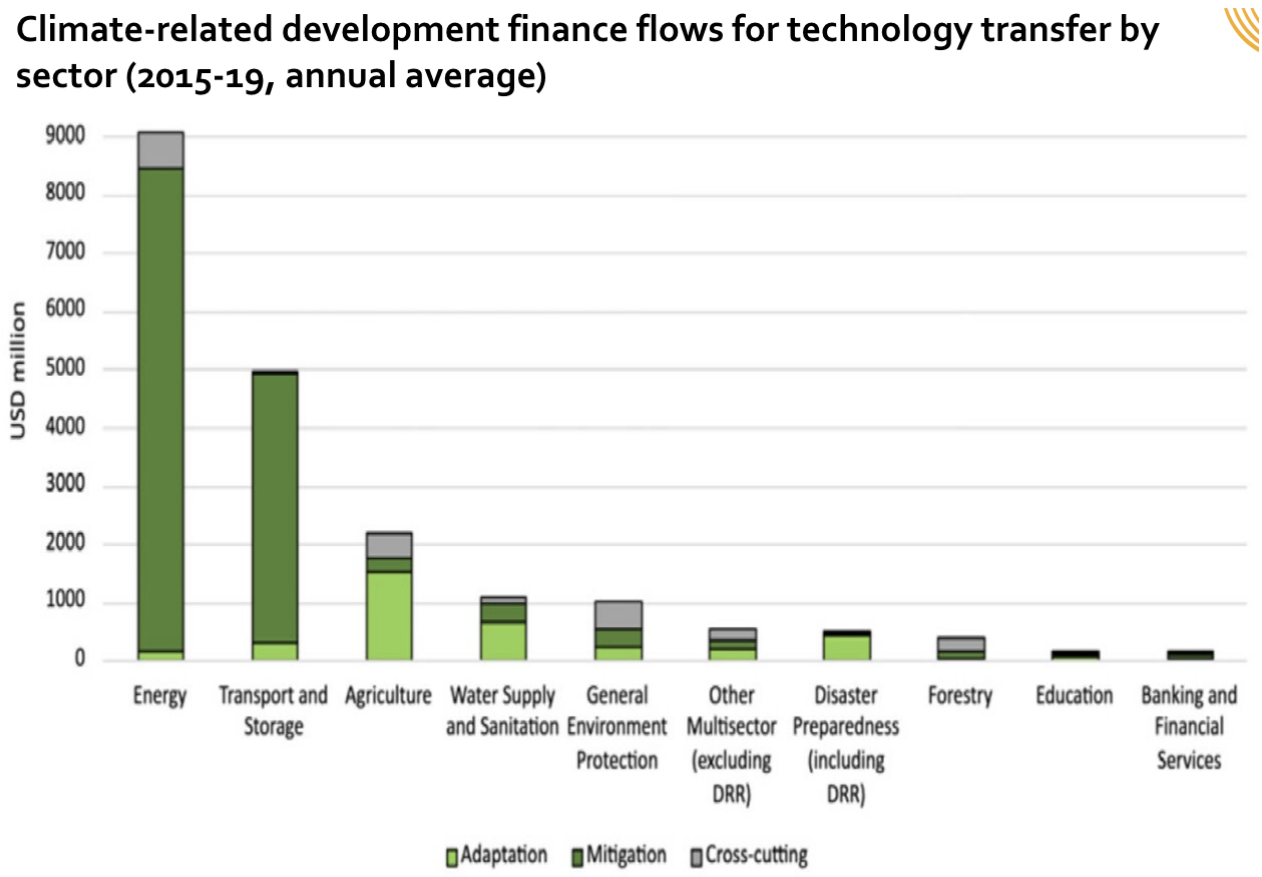


Figure 6: Composition of CAREC exports by product category, 2022

Moreover, in Figure 6 (without the PRC), we can see that mineral fuels account for more than half of the exports in the region and, in the longer term, this will have a profound impact. This also raises the question of whether these economies are sustainable with their heavy reliance on mineral fuel exports. Keeping this in mind, copper, electricity, hydrogen, and critical materials are likely to become more important in the future for these economies.



Source: UNEP, https://unepccc.org/wp-content/uploads/2023/06/tech-transfer-policy-brief-oecd.pdf

Figure 7: Technology transfer finance by sector, 2015-2019

Figure 7 shows climate-related development finance flows for technology transfer by sector (2015-2019 annual average); from this, we can clearly see that the main areas targeted are energy and transport and, to a lesser extent, water and agriculture. Furthermore, more than three quarters of global energy investment is financed by commercial sources. Around 25 percent comes from public finance and 1 percent from development finance institutions.

In 2019, 546 universities had faculties and/or degrees dedicated to fossil fuels, whereas only 247 universities had faculties and/or degrees in renewable energy. As many as 68 percent of the world's energy-focused educational degrees were oriented towards fossil fuels and only 32 percent focused on renewable energy. This means that universities are failing to meet the growing demand for a clean energy workforce. Therefore, it can be concluded that climate change and technological change are imminent and that think tanks need to refocus on climate change, related technological topics, and social impact studies.

Pathways to sustainable development: achieving high economic growth while minimizing carbon footprint

***Speaker**: Norbert Funke, Director IMF CCAMTAC, Almaty, Kazakhstan*

Is it possible to achieve high economic growth while mitigating carbon footprint? What is the growth outlook without any further reforms? The focus of this presentation was on carbon taxes and on fossil fuel subsidies. The case for one country was presented, which demonstrated two indicative scenarios on how growth could develop. The main message of this presentation was that the CAREC region is not currently on track to achieve its climate-related goals; the longer it waits the more costly it will be.

Economic growth and GHG emissions in the CAREC region

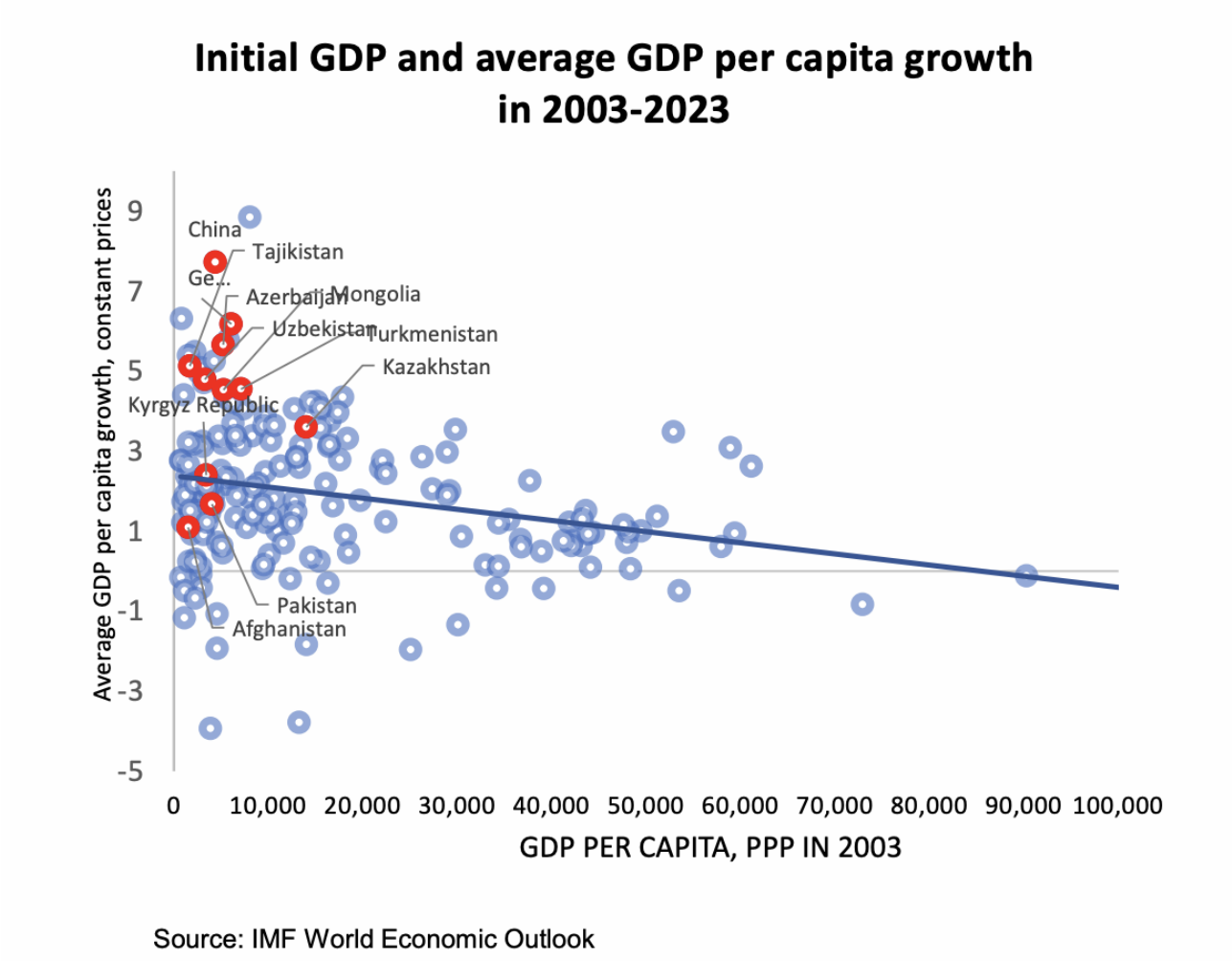


Figure 8: Initial GDP vs. average GDP growth, 2003-2023

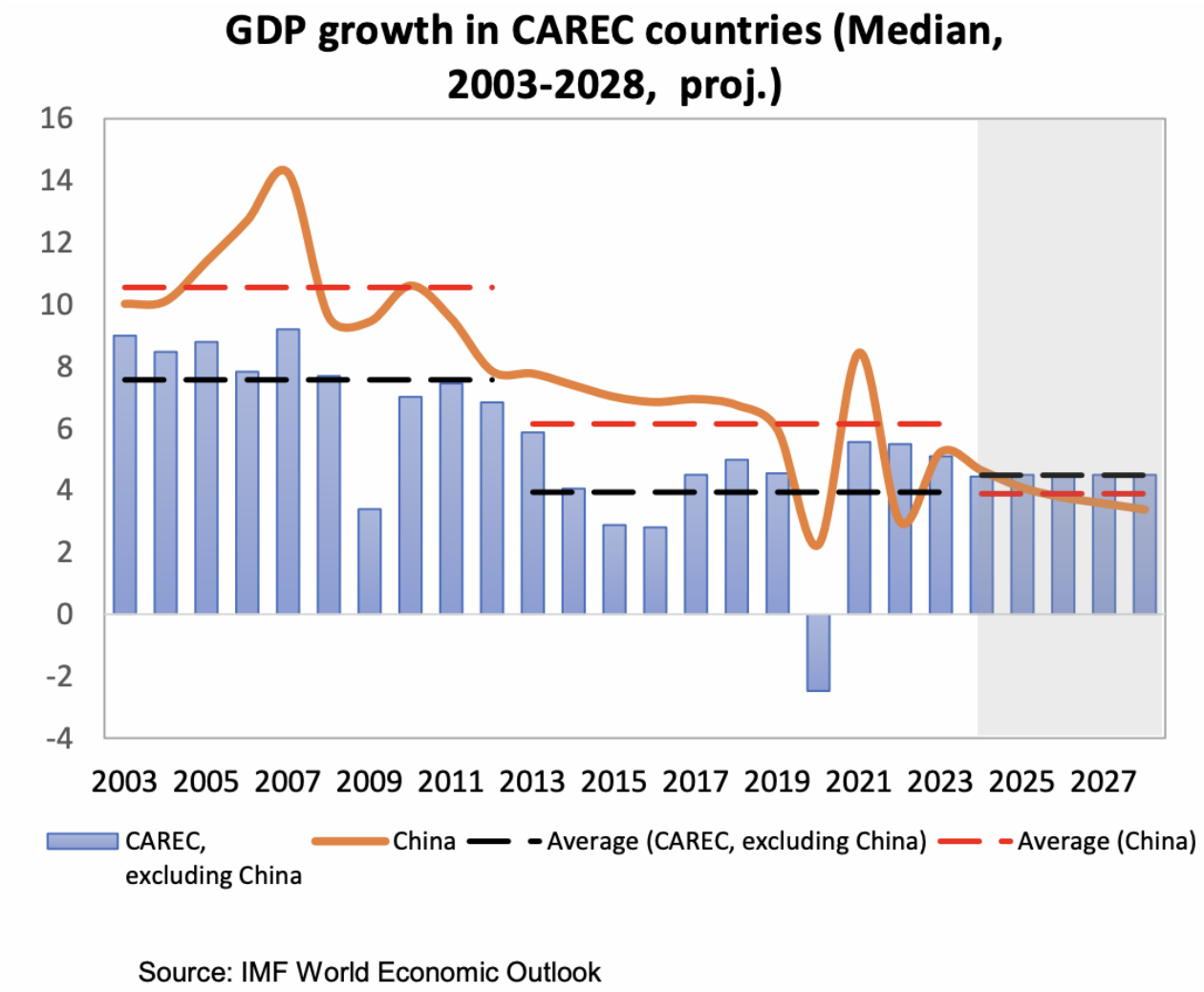
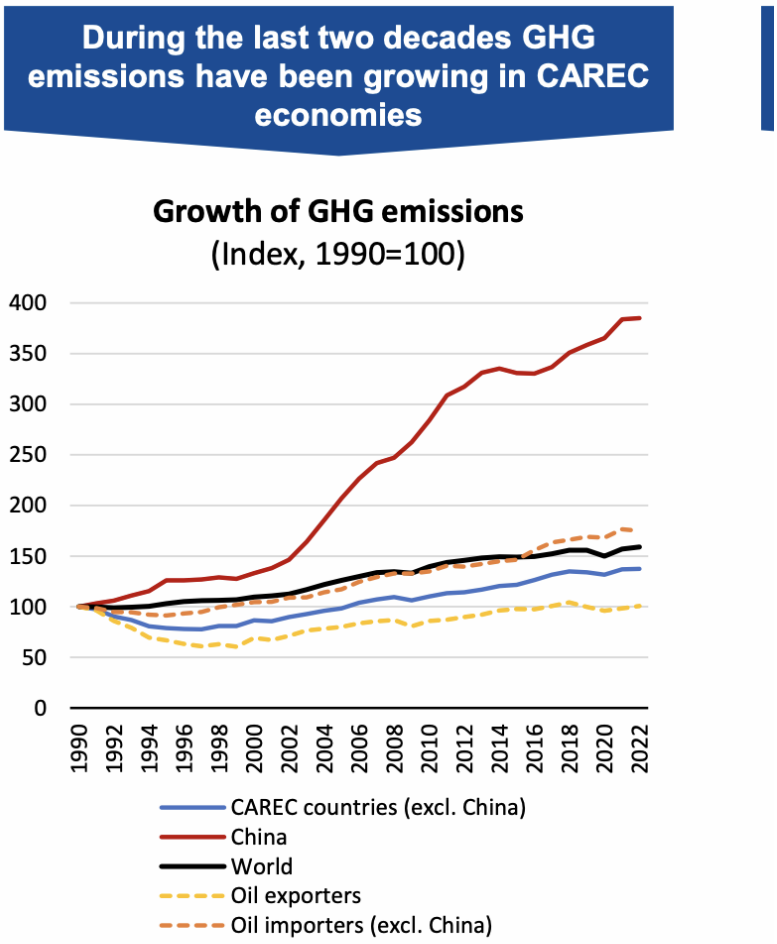


Figure 9: Average GDP growth in CAREC countries, 2003-2028

Looking at Figures 8 and 9, there has been a gradual decline in growth rates in the CAREC region over time. Looking at growth development we can see that the CAREC countries have done well compared with global averages in the past; but, at the same time, we see that growth rates have declined recently and are expected to remain moderate going forward.



Source: IMF Climate Change Indicators Dashboard, August 1, 2024.

Figure 10: Growth of GHG emissions in CAREC countries, 1990-2022

GHG emissions in the CAREC region have continued to rise quite substantially after an initial decline in some countries in the early 1990s (Figure 10). While it is quite small (excluding China) the share of GHG emissions in global emissions from CAREC countries has increased over the last two decades.

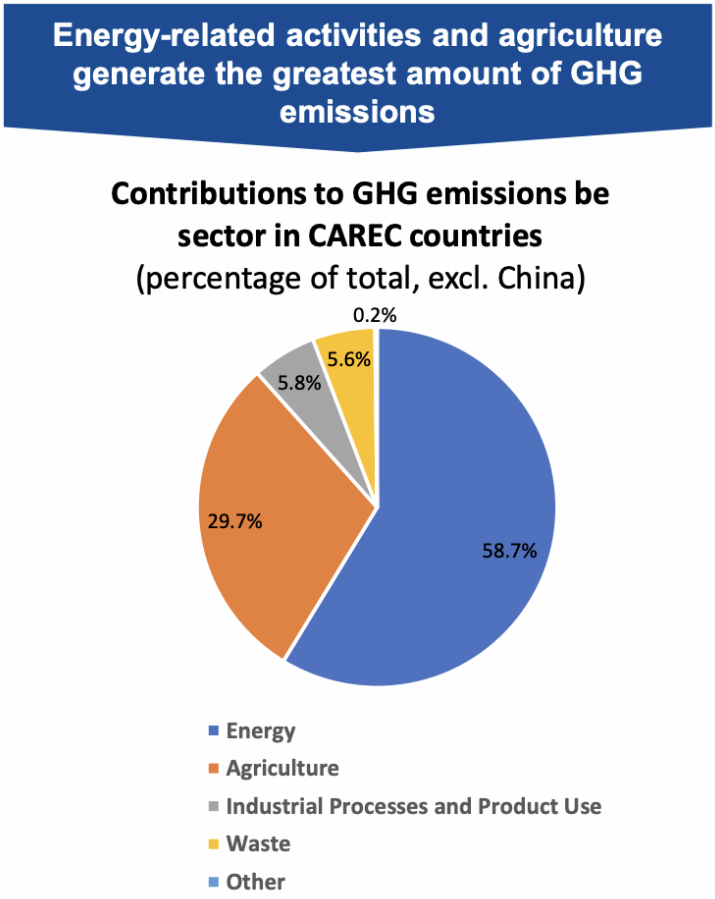


Figure 11: Breakdown of GHG emissions by sector: CAREC region

Figure 11 provides an illustration of emissions by sector in the CAREC countries. Energy and agriculture are the two sectors that contribute the most to GHG emissions in the CAREC countries.

Drivers of GHG emissions

To make policy recommendations, it is important to see what exactly is driving GHG emissions. There are four main factors to consider when trying to calculate or approximate GHG emissions, which are as follows:

1. Population size
2. Productivity per person—GDP per capita
3. Energy intensity of production (energy consumption/real GDP)
4. GHG intensity of energy consumption (GHG emissions/energy consumption)

$$GHG\ Emissions = Population \times \frac{Real\ GDP}{Population} \times \frac{Energy\ Consumption}{Real\ GDP} \times \frac{GHG\ Emissions}{Energy\ Consumption}$$

1/ Kaya identity, see Kaya and Yokobori, 1997

Figure 12: Formula to calculate GHG emissions

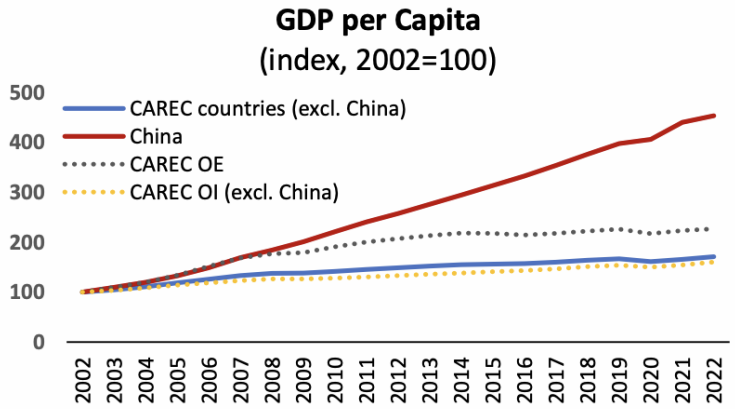


Figure 13: GDP per capita growth in CAREC countries, 2002-2022

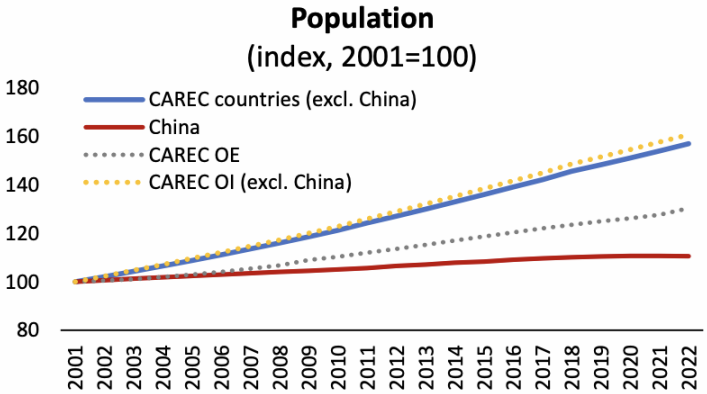


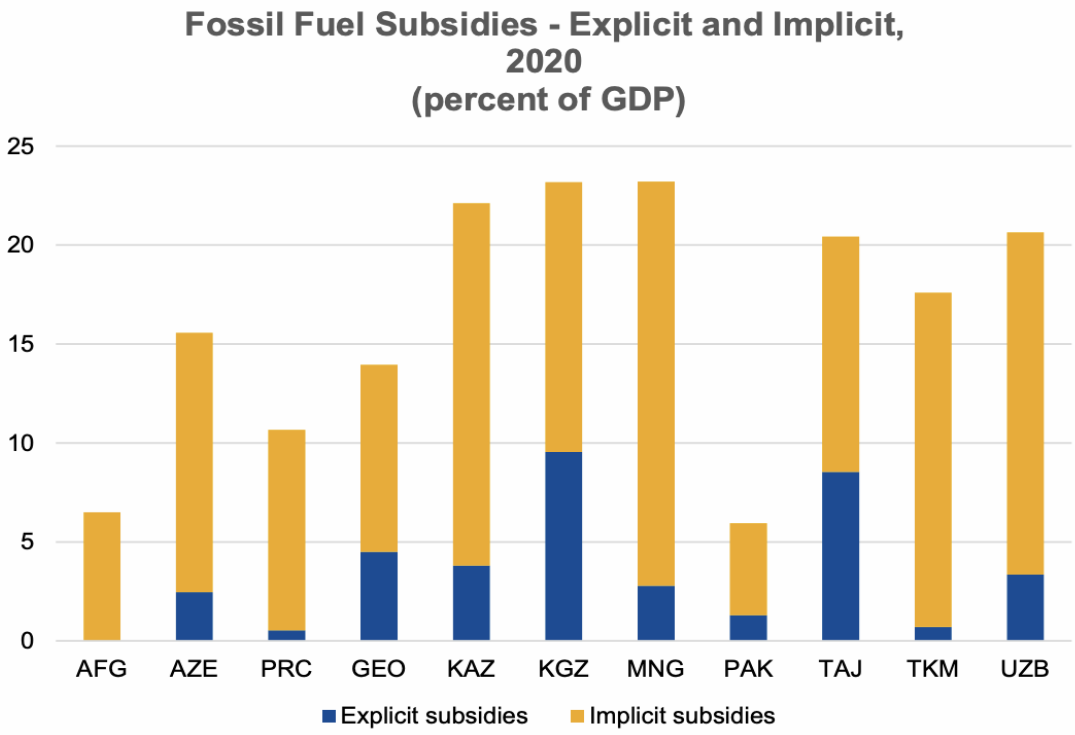
Figure 14: Population growth in CAREC countries, 2001-2022

Figures 13 and 14 show that, in the CAREC region, the main drivers of GHG emissions are substantial GDP growth and very strong population growth. However, despite there being some common areas, climate policy options cannot be generalized and must be tailored to the country's circumstances. Table 2 outlines specific areas and common areas in terms of climate policy options for CAREC countries.

	Specific areas (Examples)	Common areas
Mitigation	• **Carbon pricing**, including carbon tax/ETS, feebates in transportation and energy • **Public investment** in green innovation and infrastructure • **Regulatory reforms** (e.g., energy efficiency regulations)	• Building **fiscal buffers**, e.g. based on fiscal risk analysis • The need for **financial and technical support** from advanced to developing economies • Strengthening **financial institutions' management** of climate risks • **Domestic resource mobilization**, including developing capital markets and blue/green finance • Improving **climate data** and standards • Strengthening **public financing management**, for example, climate budget tagging • Strengthening **social safety nets** and active labor market programs
Adaptation	• Resilient infrastructure, agriculture, and water supply	
Transition (to a low-carbon global economy)	• Developing a **medium-term fiscal framework**, accounting for the global transition to a low-carbon economy • Economic diversification away from fossil fuels	

Table 2: Regional and national climate policy areas in the CAREC region

Strengthening market signals would help reduce energy intensity in the CAREC region, as would the reduction of fossil fuel subsidies. Explicit subsidies reflect underpricing as a result of supply costs being greater than the prices paid by users. Implicit subsidies reflect the difference between supply costs and socially efficient prices (incorporating the cost of negative externalities of fossil fuel use and foregone consumption tax revenues), exclusive of any explicit subsidy. Removing subsidies would strengthen market signals and it also holds true that higher energy prices tend to be correlated with lower emissions. Many CAREC countries are still contributing a significant amount of resources towards fossil fuel subsidies, which range anywhere between 5 percent and 20 percent if we look at explicit and implicit subsidies (see Figure 15).



Source: International Monetary Fund. Climate Change Indicators Dashboard, August 1, 2024, https://climatedata.imf.org/pages/access-data

Figure 15: Fossil fuel subsidies in CAREC countries

When it comes to mitigation, a cleaner energy mix could help reduce emission intensity; this would include the development of a renewable energy sector, public investment, regulatory reforms—for example, energy efficiency regulations—and the development of non-hydrocarbon industries as engines of growth. Regulatory reforms are particularly important for oil/gas exporters. Figure 15 shows that the energy supply in CAREC countries is still dominated by fossil fuels.

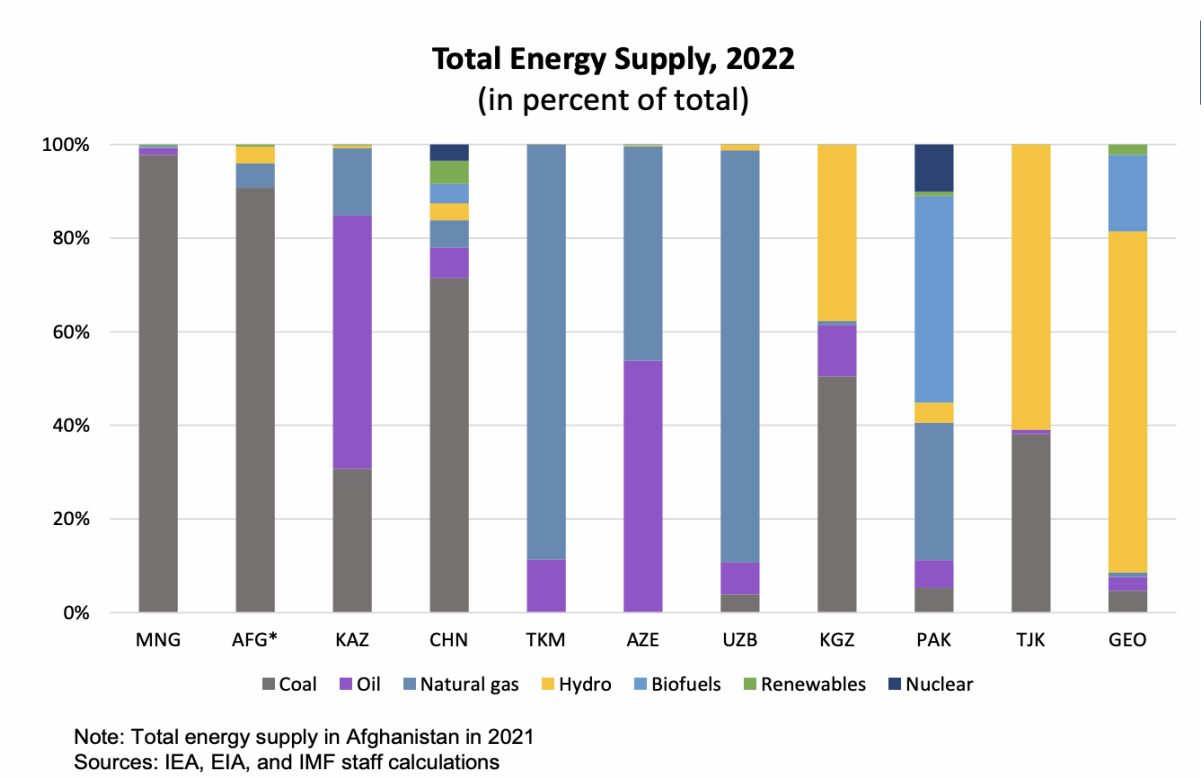


Figure 16: Total energy supply for CAREC countries, 2022

Without further preventative action, GHG emissions will rise by 7 percent a year, but the goal is to bring this figure to 0 by 2050, which is very ambitious. Even with strong mitigation, the anticipated global increase in temperature necessitates adaptation. In terms of adaptation, the agricultural sector is especially exposed to climate-related risks. To offset the adverse effects of climate change, resilient infrastructure is needed—such as, measures to improve irrigation and water management—along with the expanded use of climate-smart technologies. In this environment, both now and in the future, increased support for vulnerable groups will be key. These goals can be achieved by partnering with development partners.

The International Monetary Fund (IMF) has carried out a scenario analysis on whether a carbon tax and a reform of fossil fuel subsidies could help us achieve our goals by the end of the century. A carbon tax would produce substantial revenue, estimated at 3.5 percent of GDP, which would be used to fund several public goods. However, the big question is, how does one manage to protect the most vulnerable in either of the two scenarios presented? There needs to be much better planning and management from governments and development partners.

Moving forward, regional cooperation will be very important, which in the IMF's view will need to include substantial reforms. The diagnostics of structural determinants of growth for the Caucasus and Central Asia suggest that governance and regulatory reforms; reducing state ownership in the corporate sector; liberalization of product, labor and financial markets and current account transactions; and easing of trade and foreign exchange restrictions could raise Caucasus and Central Asia output by 5 percent to 7 percent in the medium term, while countries with better governance could derive even greater payoffs from other reforms. However, these are very difficult reforms politically and it remains to be seen how this process can be depoliticized.

To support the transition, green public financial management (PFM) practices should be used and adopted. Table 3 provides a holistic overview of green PFM practices.

Legal framework	Are Green PFM practices underpinned by an adequate legal framework?	Climate act, PFM act
Strategic Planning / Fiscal Framework	Do strategic planning tools include green concerns?	Development plan, MTBT and MTEF
Budget Preparation	Are tools in place to integrate climate concerns into budget preparation and allocation?	Ex-ante impact assessment, fiscal risks, budget circular
Budget Execution & Accounting	Is the PFM system able to track and monitor outcomes of green expenditures?	Expenditure tagging, tracking & monitoring
Control and Audit	Are oversight institutions equipped to analyze and hold to account climate-related expenditures and outcomes?	Audit institutions, Climate councils
Public Investment Management	Are all projects, planning and fund allocation, and implementation informed by present and future climate change policies and risks?	PIM rules and handbooks, CBA requirements
Fiscal Transparency	Are efforts being made to ensure transparency and accountability for green aspects across the budget cycle?	Green budget reports
Coordination with SNGs and SOEs	Do PFM practices ensure that all fiscal actors play a role in the achievement of green goals?	Coordination mechanism, reporting, aggregate analysis

Source: Green PFM, Tjeerd Tim, IMF Fiscal Affairs Department, CCAMTAC webinar, February 2022

Table 3: Public financial management practices

The goal of the IMF's (2021) climate strategy is to 'provide high quality, granular, and tailored advice to the membership on macroeconomic and financial policy challenges related to climate change.' Considering this, there is currently a focus on four areas to integrate climate change into the IMF's core activities and strong cooperation with partners: surveillance and analytical work; capacity development and data; lending and cooperation; and coordination.

In conclusion, it can be stated that to reduce GHG emissions and meet international climate targets/goals, economic growth will need to be decoupled from emissions. Current geoeconomic and climate challenges provide an opportunity to make growth more resilient, sustainable, and inclusive in the long term. Delaying reforms only makes them more costly. Climate-related reforms will need to be embedded in broader structural reforms aimed at reducing the footprint of the state, encouraging growth led by the private sector, and diversification. The mix of policy instruments to reduce energy intensity and emission intensity is country specific. In many cases, it will need to include a combination of carbon pricing; fossil fuel subsidy reform; energy market reform; and investment in renewable energy, regulations, and other innovations. This involves a delicate balance between reforms and political economy considerations. Experience points to the importance of (i) engaging proactively, (ii) depoliticizing the process (for example, having a rules-based system), and (iii) strengthening fiscal governance, including transparency. Good data is a precondition for making informed decisions and to assist in this regard the IMF has created a climate change indicators dashboard which can be accessed at climatedata.imf.org. Furthermore, numerous publications focused on climate-related analytical work have been released by the Middle East and Central Asia Department at the IMF; these would be particularly useful for CAREC member states.

Open Discussion

Johannes F Linn: What is the political feasibility and the flexibility of making these changes? Kenya just went through a huge violent reaction to an IMF-supported program. How do we make sure that we don't just look at these aggregate numbers, but that we try to determine who is losing out so that everyone else can win? How do we deal with the political impact; it is often the most politically

influential that lose out. How can we convince them that it is in their own interest and in their children's interests to implement these reforms?

Moderator: I think it is very interesting. We are not political institutions, so this is always very tricky.

Norbert: There will be big impacts; on the other hand, we have countries in the region that have started to move towards market prices. The process may need to be more gradual than we would like but, at the same time, it would be wrong to say it is impossible. Sometimes we need to make uncomfortable recommendations and then work with policymakers to see what is feasible.

Hans: We discussed energy use in the Central Asian republics with the ADB Institute. In Uzbekistan and Kyrgyzstan, most houses are heated by coal and people are unaware of the environmental consequences of this. One idea to change this was a severe carbon tax, but technical support is also needed. However, some households spend up to 30 percent of their income on heating; if you put a tax on top, this would become almost impossible. These households must be compensated. You need to have some sort of incentive to make it politically and economically viable.

Moderator: The Fergana Valley study was very interesting; the CI is to be commended for carrying it out.

Director of Research, CI: Nowadays, one of the main dilemmas is that for the last 200 years since the Industrial Revolution, the enormous prosperity achieved has been at the expense of sustainability and environmental issues. Since the 1970s, there has been a view that we need to focus on redistribution rather than all these other areas. Is it more about sustainability or redistribution?

Azerbaijan Center for Economic Reforms: As think tanks, do we have enough policies, events, and output? Are you all happy with thank tanks and their contributions in this regard? Are some countries doing more than others in this regard? We also spoke about how to avoid those who are unsuccessful in these endeavors—the losers. I would suggest that the IMF draft minimum standards, which countries should be made to adhere to.

Dr Abid Suleri: How would this carbon tax impact different income groups in various countries? In Pakistan, after the introduction of certain reforms, electricity bills are often higher than house rents and this is a big headache politically. Carbon trading systems would be a non-tariff barrier for developing countries as often we do not have the capacity to make these measurements or calculate these taxes. We are again heading towards a similar tension that the World Trade Organization (WTO) ended in the form of carbon taxes.

Sohail Naqvi: Climate change is a problem; I wonder if we have vastly underestimated it? Where should we focus our attention? Look at emissions in the US. According to the EPA, these rose in 2022.

Johannes F Linn: I think technology transfer is more important than innovation, which is often not stressed. Technology transfer is critical for these countries, but how do you facilitate that? That question links to impact at scale; it isn't so much that we need to do new and better, but rather we need to get the best off the shelf and leapfrog into the new world. Big data and AI are areas that we really must address. I think the reality that comes from the IMF analysis is an intertemporal tradeoff. Current generations will focus on current losses. Distributional aspects are where my point about needing to look at winners and losers in your process comes in very specifically. Since we didn't deal adequately with the losers, we faced a serious backlash. On the question of resource mobilization vs using resources most effectively for sustainable impact at scale, I would suggest discussing this offline and I can show you the work that we have been doing. We need ideas on how to move from a short-term focus to longer-term interventions and pathways.

Norbert: The World Bank and IMF have developed a climate assessment tool; this can serve as a basis to identify winners and losers. If we don't tax fossil fuels—the EU is doing it—the region will lose out significantly. The question about what policy instrument to use requires a region-specific and country-specific discussion.

Hans: I'm not a supporter of regrowth in general but speaking about the ratio between brown and green growth we have some paradoxes. Especially in our region, we see that countries are still relying on coal power plants, but at the same time are leading in green energy. We cannot completely stop it, but we need strategies to switch quicker. I think it is very important to study general taxonomy whether you are financing green or not and where to transfer green technology or not. Kazakhstan is working on this, and this would be a good example for the region as well.

Moderator: Perhaps we need to move from being think tanks to do tanks—move from analysis and reports more towards doing and carrying out actual action. This may be a more practical and effective solution to addressing climate change, which is an imminent threat and urgently needs to be addressed. The knowledge produced and this forum is all about this and is therefore very important. Thank you.

SESSION III: ASIA IN THE GLOBAL FIGHT AGAINST CLIMATE CHANGE: CAPTURING SUBREGIONAL PERSPECTIVES

Asia's path to simultaneously achieving a high level of economic growth and decarbonization is fraught with multiple risks and enormous challenges. The dilemma of balancing carbon-intensive economic growth and climate change is one faced by all nations across the board in high-income, low-income, and emerging economies in Asia. As a manufacturing hub and the largest carbon emitter globally, the region faces the critical task of balancing economic growth with reducing carbon footprint. Despite having the per capita energy consumption of one third of the Organisation for Economic Cooperation and Development (OECD) countries, Asia's energy needs are expanding owing to its growing middle-class population. Diverse subregions within Asia are at different stages of development with varying degrees of climate-induced vulnerability. In this session, perspectives from peer regions—ASEAN, GMS, and CAREC—were discussed. In this moderated session, the speakers made presentations (15 minutes each) on their respective topics, and the moderator led and facilitated a discussion (25 minutes) by inviting questions, comments, and participant feedback.

***Moderator**: Mr Sergei Ulatov, Deputy Managing Director, EFSD*

ASEAN's path to net zero: policy framework, supporting initiatives, and the pathway

***Speaker**: Ms Marthe M Hinojales, Senior Economist, Regional Surveillance, ASEAN +3 Macroeconomic Research Office (AMRO), Singapore*

In Figure 18, the red circles represent each region’s share of fossil fuel emissions and one can see that ASEAN+3 contributes a large share. This means that there is a need for a complete transformation. When one is thinking about the pathways to net zero there are three questions to ask:

1. What are the macro financial implications of transitioning out of a high-carbon economy?
2. Where are the opportunities for transitioning into a carbon-neutral economy?
3. How can finance play a role?

Key to the transition is pricing carbon emissions appropriately and reducing fossil fuel use; yet, without ready low-carbon alternatives, this could lead to a sustained increase in inflation—a result of the fact that carbon pricing policies typically involve adjusting energy prices upwards, which will impact inflation as ASEAN+3 relies on fossil fuels. Second, the adjustment will also call for a phaseout. Currently, six out of ten ASEAN+3 members are still subsidizing fossil fuels (Table 3). Furthermore, appropriate pricing of carbon emissions would also push up inflation.

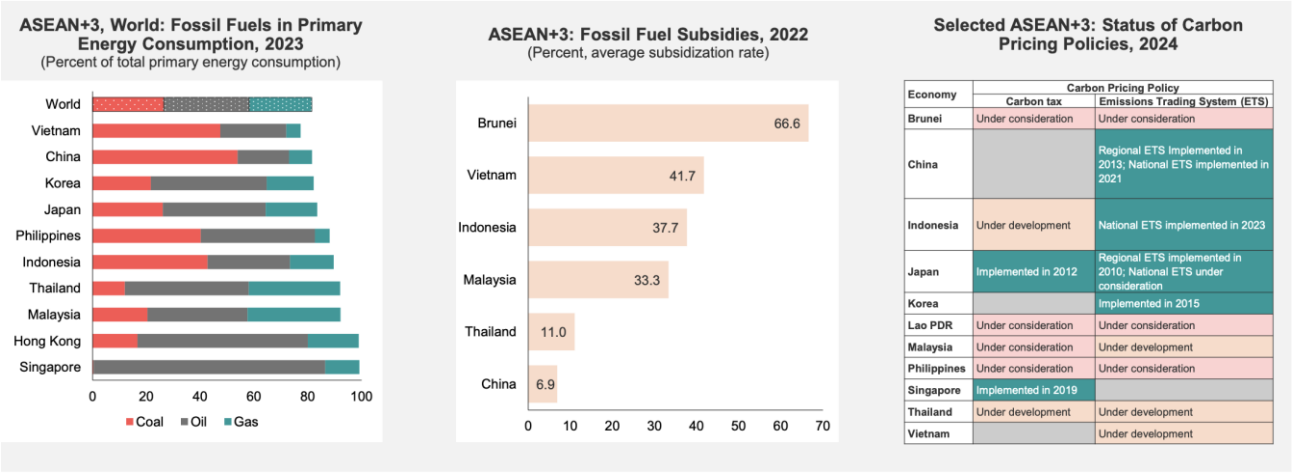


Figure 17: Fossil fuel use, subsidy rates, and carbon pricing in ASEAN+3 countries

Carbon pricing and border carbon adjustments (BCAs) could substantially reduce the relative competitiveness of ASEAN exporters. ASEAN+3 accounts for about 10 percent of emissions in global trade, and the impact of BCAs on exports and GDP will be significant if coverage is expanded. The impact on ASEAN trade with the European Union, in terms of an initial coverage scenario, which covers six targeted sectors (aluminum, cement, chemicals, electricity generation, fertilizers, iron and steel) would result in less than half a percent reduction in exports. However, in the scenario where the carbon border adjustment mechanism (CBAM) has a full coverage of all sectors, goods, and services, there would be a decrease of more than 10 percent in ASEAN+3 exports to the European Union.

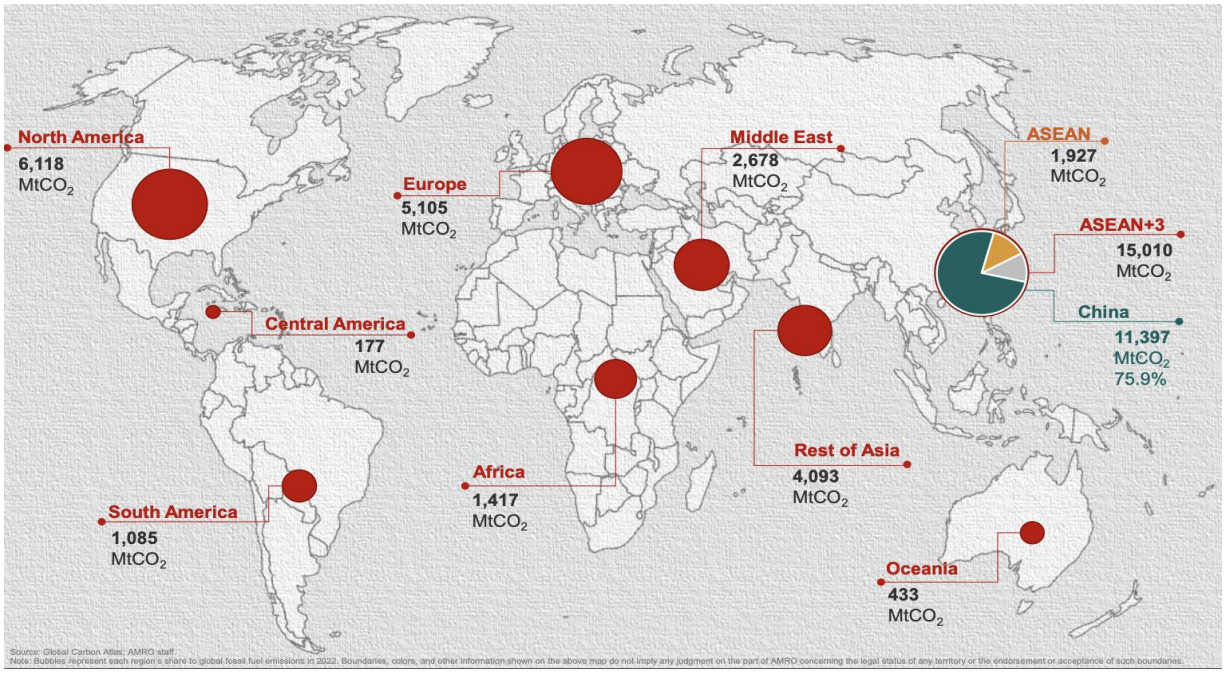


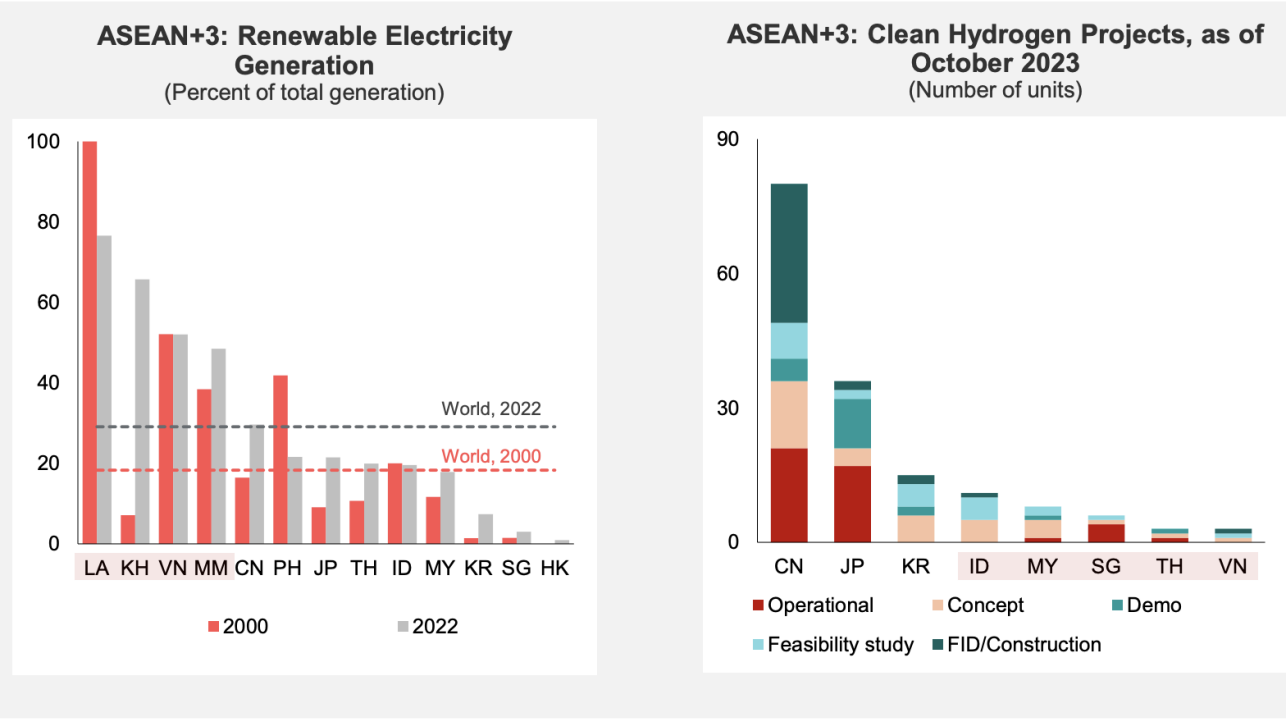
Figure 18: Regional contributions to global fossil fuel emissions, 2022

Deep and rapid structural adjustments required by net zero will result in stranded assets, which could have implications for ASEAN's financial stability. Of bank loans, 60 percent are also facing transition

risks. To avoid stunting growth, the shift out of fossil fuels must come with higher efficiency. Since ASEAN+3 will be growing in the decades to come then energy efficiency must gain traction.

The falling energy intensities in ASEAN+3 represent good progress, but these need to decrease still further. Carbon intensity will also define how the region progressively phases out fossil fuels. Can ASEAN meet its energy needs by relying on green sources alone? Even advanced economies are unable to do so. Are there any opportunities and where are they coming from? Protecting ASEANs long-term growth while transitioning away from fossil fuels will depend largely on future energy efficiency gains and expanding the markets for clean energy and low emissions products. This should help scale up renewables; it is noticeable (Figure 18) that it is actually smaller countries that have been able to grow this by quite a lot.

On a more positive note, there are also many opportunities for ASEAN+3 that arise from transitioning into a carbon-neutral economy. The net zero transition holds prospects of expanding markets for ASEAN, especially in clean energy and low emissions products. One key area that has been identified by AMRO is clean hydrogen, which is hydrogen produced with low or zero emissions; it is a good option to decarbonize heavy industry and transport. There are also several clean hydrogen projects that are operational and in the pipeline in ASEAN+3 (see Figure 19).



Source: International Renewable Energy Agency; AMRO staff calculation.
Note: BN = Brunei; CN = China; HK = Hong Kong; ID = Indonesia; JP = Japan; KH = Cambodia; KR = Korea; LA = Lao PDR; MM = Myanmar; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; VN = Vietnam.

Source: International Energy Agency; AMRO staff calculation.
Note: CN = China; KR = Korea; FID = final investment decision; ID = Indonesia; JP = Japan; MY = Malaysia; SG = Singapore; VN = Vietnam.

Figure 19: ASEAN+3: growth in renewables and clean hydrogen development, 2000-2023

Another opportunity in ASEAN+3 comes from the rise of electric vehicles, which will bring about new jobs and options in the ASEAN region and a much needed transformation in the region's auto industry. All ASEAN+3 members have adopted targets in terms of usage and production; however, many ASEAN states are still considered to be lagging behind in the adoption of electric vehicles. Existing concerns in ASEAN+3 economies are diverse, including insufficient charging infrastructure, poor performance, and range issues. Demand for energy storage and critical minerals is high and is set to increase as electric vehicle adoption increases; ASEAN has untapped markets for these applications. An electric vehicle requires six times more minerals than a traditional car, which also means unfortunately that there are some emissions that cannot be removed entirely.

Carbon capture can help minimize the risks from asset stranding, while carbon offsetting can create new financial assets from natural endowments. ASEAN has the youngest coal plants (all younger than 15 years) when compared to selected countries (see Figure 20).

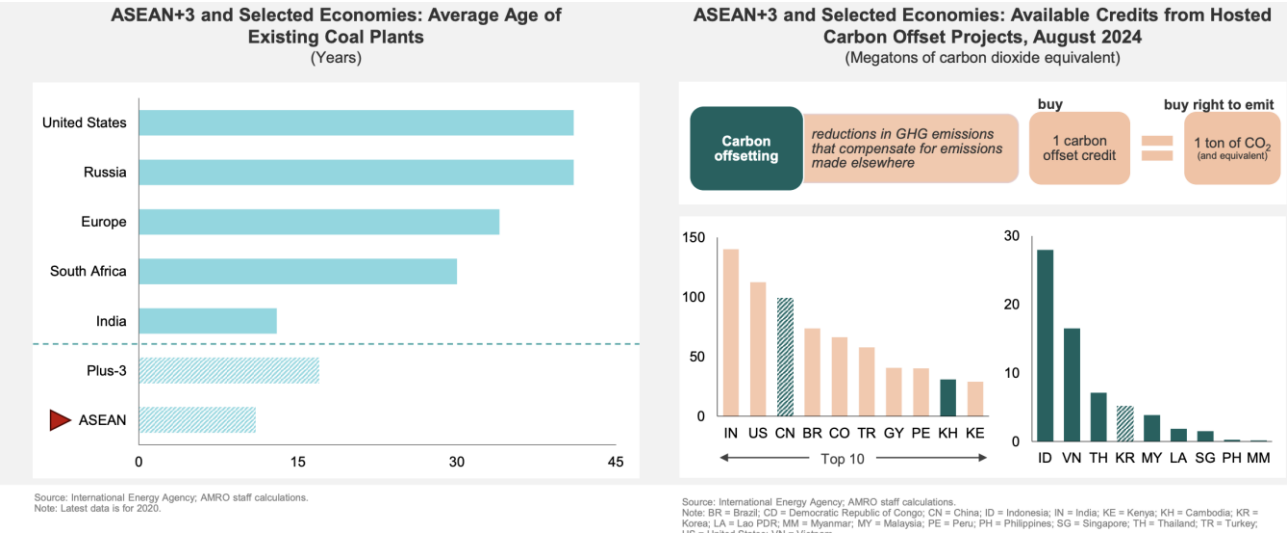


Figure 20: Coal plant ages vs. carbon offsets in ASEAN+3 and key economies

However, it is promising to see that countries like Cambodia and China are faring very well (see Figure 19) and are in the top ten in the ranking of suppliers of carbon credits. Indonesia is also notable in its progress in this regard and financial centers like Singapore could be a hub for these instruments. Afforestation is another method of carbon offsetting, but all these methods require massive funding. So, on a positive note, ASEAN financial markets are increasingly adopting the tools and practices for further green finance. There is robust growth in green bonds and labeled bonds.

That said, there is still a huge financing gap in ASEAN; this is particularly true in transition financing where a lot more money is needed. Many sectors will not be able to meet the Paris benchmarks that are set for 2030. There is a need to grow the transition financing market, especially for sectors with non-green, high-carbon activities.

The key takeaways from this research are listed as follows:

Micro financial implications

- All ASEAN economies have made commitments to mitigate climate change. The key to mitigation is to put an appropriate price on carbon emissions.
- But with the region relying mainly on fossil fuels, carbon pricing carries implications for inflation and export competitiveness in the medium to long term.
- Some economies also face substantial risks from stranded assets, with potential consequences for regional financial stability.
- The sooner scalable, reliable, and affordable low-carbon alternatives become available for ASEAN, the less painful and costly the transition away from fossil fuels will be.

Role of finance

- Indeed, the road to net zero is rich in opportunity.
- Many ASEAN economies are already well-placed to leverage their existing comparative advantage in areas of manufacturing, natural resources, and financial services to reap the economic benefits from the transition.
- By mobilizing private capital, ASEAN can realize the economic gains from the net zero transition while minimizing its negative impact on growth.

- Comparable standards and frameworks across the region for sustainable finance instruments will be crucial in accessing the much-needed financing.

In conclusion, there are several policy recommendations for individual economies and for the broader region as a whole:

For individual economies

- Utilize climate-informed public expenditure and fiscal tools for an orderly transition
- Enhance the ability of the financial system to mobilize green and low-carbon financing
- Maintain the integrity of green markets and instruments through transparency and standard setting
- Strengthen cross-government agency coordination to ensure alignment with a credible economy-wide, long-term transition strategy

For the region

- Accelerate energy cooperation and cross-border renewable energy exchange
- Explore regional green project developments, harnessing the power of public–private partnerships
- Strengthen regional sharing of knowledge and innovative technologies to promote widespread rollout
- Advance green finance networks

Greater Mekong Subregion: enhancing synergies and subregional cooperation for climate resilient and net zero development

***Speaker**: Suriyan Vichitlekarn, Executive Director, Mekong Institute, Thailand*

The GMS region consists of Cambodia, China (Yunnan, Guangxi), Laos, Myanmar, Thailand, and Vietnam and covers an area of about 2.6 million km^2 with a population of more than 340 million people. It is an area rich in minerals, forests, and water. The GDP growth rate from 2021 to 2023 for the region averaged 3.57 percent with significant growth and the key sectors were agriculture, manufacturing, tourism, and trade. In terms of social development, there is a focus on healthcare, education, and social services with the goals being poverty reduction and addressing inequality.

Furthermore, the GMS region has substantial opportunities for growth. Marine connectivity will allow the GMS to shape the future in this region and it is indeed being recognized as a regional production base and trading hub.

In comparison to the CAREC region, the area encompassed by the GMS region has a much smaller landmass and is densely populated with growing economic activities. However, in common with CAREC and Central Asia, the GMS region faces a number of challenges. The context here is slightly different because the GMS is connected to the sea, depends largely on its workforce, and faces extreme climate events. The GMS faces issues and challenges that are related to climate resilience and net zero development, which are listed as follows:

- Vulnerability to climate change
- Sectoral impacts
- Economic losses
- Technological and infrastructure barriers
- Technological innovation
- Infrastructure vulnerability
- Socioeconomic impacts
- Economic disparities
- Job displacement
- Financial and investment challenges
- Insufficient investment
- Funding mechanisms
- Policy and regulatory issues
- Policy coherence
- Regulatory frameworks
- Coordination and cooperation

The situation in the GMS region may be slightly different but the context of the response is perhaps similar and this can be discussed in detail. To address the issues listed above, the GMS region has come up with the following policies to increase climate resiliency and net zero development:

- Regional climate strategy
- Commitment to net zero
- Renewable energy initiatives
- Agrifood systems transformation
- Water resource management
- Disaster risk reduction
- Regional cooperation platforms
- Policy support and capacity building

There is a disparity in that the implementation of policy lags behind the actual designing and drafting of policy. The Conference of Parties (COP) is 29 next month and only now are policymakers and

think tanks getting up to scratch with the outcome of COP27 and COP28. There is an urgent need to look at the strategic long-term path.

The Mekong Institute (MI) was founded in 1996 in Cambodia and focuses on the GMS region; it is not attached to any cooperation organization, rather it is an intergovernmental organization in the Greater Mekong Subregion. MI has 50 staff and works in partnership with national institutions; it also has a collaboration center, with its main competence being human resource development, capacity building, and project implementation, supporting regional cooperation and integration. It is important to note that MI carries out development and operational research but no academic research. The mandate is to support capacity development and project implementation. MI is now promoting green and resilient growth. Central Asia does not have the CAREC Program alone and CI may need to adjust and evolve the way in which they provide technical knowledge. MI is also the regional coordinator of the GMS knowledge network. Today, MI provides the following activities and services:

- Organizes training, workshops, seminars, conferences, and structured learning visits
- Implements projects
- Facilitates policy dialogs
- Provides advisory services
- Conducts research and studies
- Acts as a network coordinator/secretariat (ASEAN Climate Resilience Network)

MI believes that there are four key approaches towards climate resilience building, as follows: leveraging regional cooperation integration mechanisms; promoting best practices and successful models; enhancing capacity and confidence in setting and achieving NDCs; and connecting and strengthening networks.

There are many cooperation mechanisms in place in the GMS region and someone needs to assist them. The balance must be struck, and direction must be maintained. The following are all the cooperation mechanisms currently in place in the GMS:

- GMS Economic Cooperation Program (GMS Program)
- GMS Core Environment Program (CEP)
- ASEAN Mekong Basin Development Cooperation (AMBDC)
- ASEAN Working Group on Climate Change (AWGCC)
- Initiative for ASEAN Integration (IAI)
- Mekong–Lancang Environmental Cooperation
- Lancang–Mekong Cooperation (LMC)
- Mekong River Commission (MRC)
- Ayeyawady–Chao Phraya–Mekong Economic Cooperation Strategy (ACMECS)
- Other Mekong Plus Cooperation (Australia, India, Japan, RoK, US)

MI helps to translate policy into action and works primarily on the supply side, but also on the demand side. In the GMS region, there has been too much focus on the supply side; when there is no market, there is no incentive. Tourism is another sector in which MI operates; however, much of MI's work today is focused on energy efficiency. Another aspect of MI's tasks is the management of funds and MI tries to use funds as part of portfolio development through multi-subregional cooperation mechanisms. It is very important to develop a mechanism that can handle funds; this took five to six years—for example, the Mekong–RoK Cooperation Fund which is managed by MI. MI would be pleased to share this experience if CI is interested. As institutions, MI and CI work in similar fields and there might be a significant opportunity for exchange. Areas for collaboration between MI and CI include the following:

- South–south/intersubregional exchanges
- Experiences in subregional strategy
- Best climate-resilient or low-carbon practices
- Scalable business models

- Engaging private sector networks
- Joint proposals
- Hosting scholar visits

Climate vulnerabilities of the CAREC region: policy options for a sustainable future

***Speaker**: Iskandar Abdullaev, International Water Management Institute (IWMI), Country Representative for Pakistan*

When it comes to discussing policy options that deal with climate change and a sustainable future, it is very important to ask what is going on and how or where support can be provided in the context of the CAREC region and what the needs of the region are. Consideration should also be given to policies and solutions that take care of this challenge, keeping in mind the specific contexts of this region.

The attributes of climate change in the CAREC region are as follows:

- The temperature increase is definite and will be between 3ºC to 7ºC by the end of the century, compared with 1981 to 2010. It will be a hotter region.
- There will be an increase in heat days (>35ºC) of up to 80 days more per year in the plains.
- Slight to strong increase in total precipitation depending on the climate scenario and a general increase in extreme precipitation (20 percent to 30 percent increase in maximum one day of precipitation).
- An increase in drought in the plains up to 30+ trough days per year, which is a sharp contrast between the mountains (TAJ, KGZ, KAZ) where drought indicator decreases.

The impacts of climate change on the following five areas in the CAREC region:

Water

- Glacier melt initially increases discharges in headwaters, and towards the end of the century decline
- Earlier snowmelt increases spring flows
- A transition from snowfall to rainfall makes water availability more erratic
- Heat increases evaporation of water (drought) and reduces water quality
- Heavy precipitation leads to more frequent flooding, causing damage to water and sanitation infrastructure
- Drought reduces water availability
- Increased sedimentation rates can lead to a lowering of storage capacity in reservoirs

Agriculture

- Heat increases crop and livestock water demand and crop stress
- Extreme precipitation (including hail) can cause damage to crops
- Drought decreases agricultural production
- Higher temperatures and increasing carbon fertilization may increase agricultural productivity
- Geographical suitability for agriculture in high-altitude areas may increase
- More erratic rainfall can pose problems for rain-fed agriculture and make irrigation sources less reliable, or lead to more groundwater pumping
- Drought may increase soil salinity
- Increasing extreme precipitation can lead to waterlogging and inaccessibility of agricultural land

Energy

- Increased water temperature hampers the cooling of thermal and nuclear power stations, and more erratic flows may lead to the unavailability of cooling water

- Heat reduces efficiency of the generation, transmission, and distribution of energy
- Heat increases cooling demands, increasing energy demand
- A shift to a more erratic hydrological flow regime reduces the efficiency of hydropower plants
- More extreme flows will increase sedimentation, lowering the lifetime of hydropower infrastructure
- More frequent floods and landslides lead to more damage, energy generation, and distribution infrastructure

Transport

- More heat causes more damage to road pavement
- More floods/landslides/avalanches lead to more road damage (including bridges) and railroads
- The vulnerability of road pavement to heat favors investment in railroad transport
- Higher drainage capacities to deal with more intense rainfall
- More protective engineering structures to protect infrastructure from landslides, rockfalls, avalanches, flooding

Health

- More heat increases heat stress for human bodies, mainly increasing respiratory and cardiovascular diseases
- Heat decreases air quality
- Higher temperatures reduce drinking water quality and favor the spreading of disease
- More frequent droughts lead to reduced drinking water availability, improving cooling in homes and public spaces
- Improve healthcare

Having gone through the attributes and impacts of climate change in the CAREC region, it can be said that this region is likely to be the worst hit by the impacts of climate change. Central Asian countries have exhibited much higher rates of temperature growth compared to global averages over the past hundred years. Central Asia has also reported an increasing frequency of adverse natural disasters of a wide spectrum. The magnitude of the future rise of temperature and shifts in the precipitation patterns in the region will likely exceed the scale of the observed historical changes. Climatic change in the region will cause significant changes in annual volume and seasonal patterns of river runoff. Furthermore, although CAREC countries have a high level of vulnerability to climate change, they have a low level of readiness, which means that these countries have both a great need for investment and innovation to improve readiness and an urgency for adaptation action. There are also countries with a low level of vulnerability to climate change and a low level of readiness in CAREC—for example, Mongolia. Such countries face relatively fewer challenges from climate change, but are less able to take in investment. Alternatively, countries with low levels of vulnerability to climate change and a high level of readiness are well positioned to adapt. Although less vulnerable, these countries still face some adaptation challenges.

The agricultural sector is one that is still a mainstay for many economies in the CAREC region when it comes to being a driver of GDP output. This sector is also likely to be hit the hardest owing to climate change. Projected growth in temperatures and extended periods of extremely hot days coupled with changing precipitation patterns will lead to a higher incidence of drought conditions for rainfed agriculture over most of the CAREC region. Reduced stream flows and higher demand for irrigation water will likely intensify water shortages and crop failures in arid and semi-arid parts of the region. The fodder base for livestock farming in the northern part of the CAREC region will be adversely affected by a higher incidence of unfavorable meteorological conditions.

The availability of arable land and water resources is going to decrease across all countries, except Georgia and Mongolia. Land degradation will increase as salinity and desertification accelerate owing to drier years. The demand for electricity in agriculture will increase as water productivity is lower in the CAREC region. Wheat, rice, and cotton—widely grown in the CAREC region—have

inappropriately high land and water use shares and will become increasingly difficult to cultivate. Alternative crops that could be cultivated are vegetables, fruit, and nuts.

Of energy production in the CAREC region, 70 percent comes from conventional sources and, on a positive note, longer sunny days and wind could help to increase the share of renewables. However, in the majority of CAREC countries, both the share of solar energy and solar photovoltaic production is still in a nascent state.

Country	Updated NDC, target by 2030	Climate Strategy	Net-Zero target	NDC implementation plan	Green Transition of the Economy Strategy	Long-term Strategy	National or Sector Adaptation Plan(s)
Armenia	2021, 40% reduction from 1990 emission levels	Not applicable	Not applicable	under development	Draft not passed in 08.2023; pending	Yes, 2023, 2050 mitigation goal: 2.07 tCO2e per capita per annum	NAP 2021-2025
Azerbaijan	2023, 40% reduction from 1990 emission levels by 2050	Yes	Not applicable	Not applicable	Not applicable	Not applicable	under development
Georgia	2021, uncond. 35% reduction from 1990 emission levels	Yes, 2021 and action plan	2050	Not applicable	Not applicable	Yes, 2023	Yes, 2017 Agricultural SAP
Kazakhstan	2023, uncond. 15% reduction from 1990 emission levels	Not applicable	2060	Not applicable	Yes, 2013	Yes, 2020	Not applicable
Kyrgyz Republic	2021, uncond. 15.97% reduction below BAU	Not applicable	Not applicable	draft available and under public discussion (12.2023)	Yes, Phase 1 2019-2023	under development, supports by UNDP	SAPs under preparation, supported by UNDP, GIZ, and ADB
Pakistan	2021, uncond. 15% reduction from 1990 emission levels	Updated National Climate Change Policy, 2021	Not applicable	under development and provincial plans	Not applicable	Under development	Yes, 2023
Tajikistan	2021, uncond. 30-40% reduction from 1990 emission levels	Not applicable	Not applicable	Not applicable	Yes, 2023	Not applicable	National Adaptation Strategy, 2019
Turkmenistan	2022uncond. 20% reduction below BAU (reference 2010)	Yes, passed in 2012	Not applicable	Not applicable	Not applicable	Not applicable	under preparation
Uzbekistan	2021, 35% reduction from 2010 emission level	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	under preparation; UNDP. 2021

Table 4: Climate strategies and plans of CAREC member states

Table 4 has details of the climate strategies and plans of CAREC member states. To combat climate change, CAREC countries need to adopt climate-smart policies.

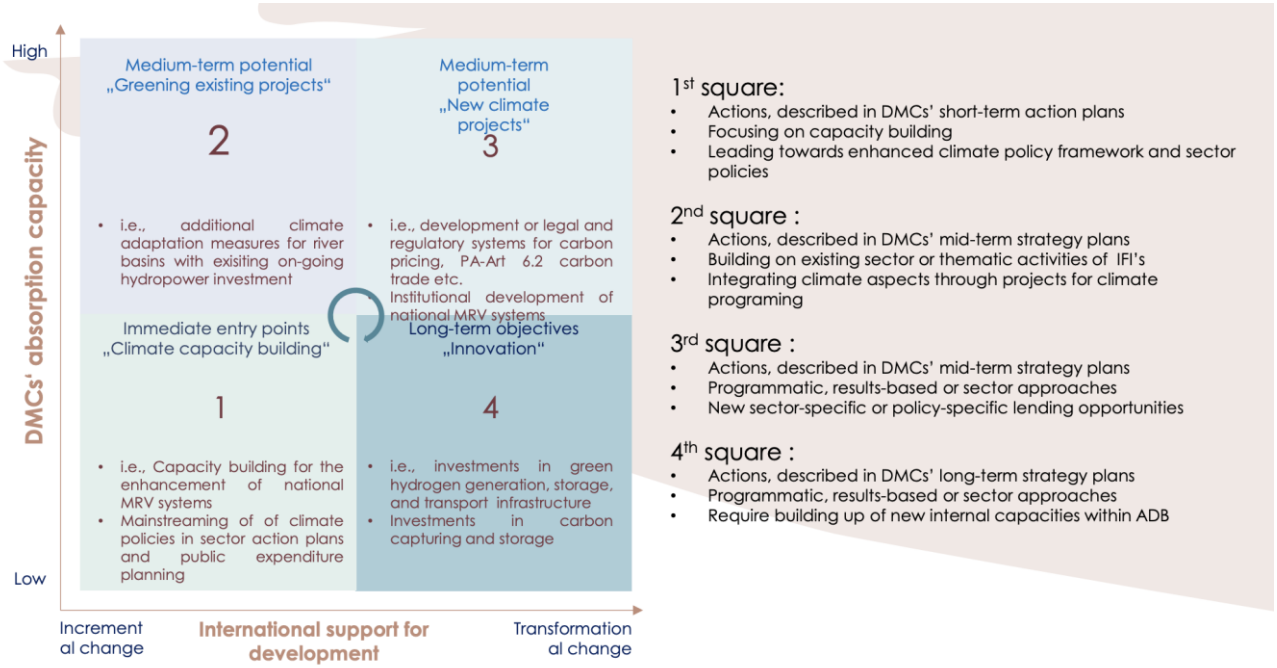


Figure 21: Pathways for climate capacity building and innovation in DMCs

- Estimating economic costs of climate change—prioritize investment strategies in the future. Suitable mitigation and adaptation mechanisms—reduce environmental impact owing to the vulnerability of the population, especially in rural areas.
- Adaptation of higher water use efficiency technologies, establishment of early warning systems for climate-related extreme events, implementation of no-till technologies and crop diversification, afforestation, improved crop management—suitable adaptation and mitigation mechanisms for most CAREC countries.
- Financial tools and mechanisms: credit, insurance, subsidies, carbon market and taxation—suitable financial mechanisms—yet underdeveloped in CAREC countries, except in a few cases and countries.
- Example of successful implementation of financial mechanisms: dissemination of conservation agriculture in Kazakhstan and adoption of index-based insurance for livestock production in Mongolia.

As things stand, the total financing needs for current NDC-2030 commitments in West and Central Asia amount to about USD 300 billion.

CAREC countries also need to ensure that governance is climate smart. Effective climate governance should create a system of interactions with global and regional developments and financial stakeholders, allowing for analysis of how different financial resources are directed rationally in tackling climate challenges. Furthermore, effective climate governance brings opportunities to countries and the CAREC region for further scaling up efforts to tackle climate change challenges by mobilizing untapped funds, expertise, and technologies.

If there is a lack of effective governance, there is weak coordination and/or limited interagency cooperation, which downplays the practical application of laws and response policies. Therefore, it is important to analyze and understand how policy coordination patterns are aligned in reinforcing mechanisms.

NDC-SDG connections are also important in terms of the assessment of policy coherence in the CAREC region and prospective entry points for changing or improving governance in the countries, also regarding legislation.

In conclusion, comprehensive policy mechanisms enable clear interaction in both vertical and horizontal dimensions of governance and a broader understanding of the involvement of the private sector, local farmers, and populations in the decision-making process of national climate policies.

Decarbonizing global value chains in CAREC: impact of the European Union's CBAM on CAREC economies

***Speaker**: Altynay Arapova, Economist, Regional Cooperation and Integration, ADB*

The CAREC region is the least integrated compared to other subregional initiatives. The Asia–Pacific Regional Cooperation and Integration Index (ARCII) uses eight types of data dimension to assess intraregional integration across Asia–Pacific, giving an index rating from zero (least integrated) to one (most integrated). According to ARCII, the CAREC region has the lowest rating of about 0.3, which is lower than GMS and ASEAN. The CAREC Regional Integration Index (CRII) looks at six socioeconomic dimensions (with 26 constituent indicators) for each CAREC member country and for the region as a whole. CAREC is the least integrated in Asia in the regional value chain dimension. The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) Digital and Sustainable Trade Facilitation Score 2023 carries out a comparative analysis of 60 trade facilitation, cutting-edge paperless and cross-border trade facilitation measures implemented across over 140 countries and five regions worldwide with a percentage score from 0 percent (zero implementation) to 100 percent (perfect implementation). According to this measure, Northeast Asia has a score of 82.53 percent, Southeast Asia has a score of 75.95 percent, and CAREC has the lowest score in the region of 69.57 percent. To enhance resilience to supply chain disruptions and food security, CAREC members more than ever need to work in unison to reinvigorate regional cooperation.

CAREC's participation: challenges and opportunities

Figure 22 gives a breakdown of global value chains (GVCs).

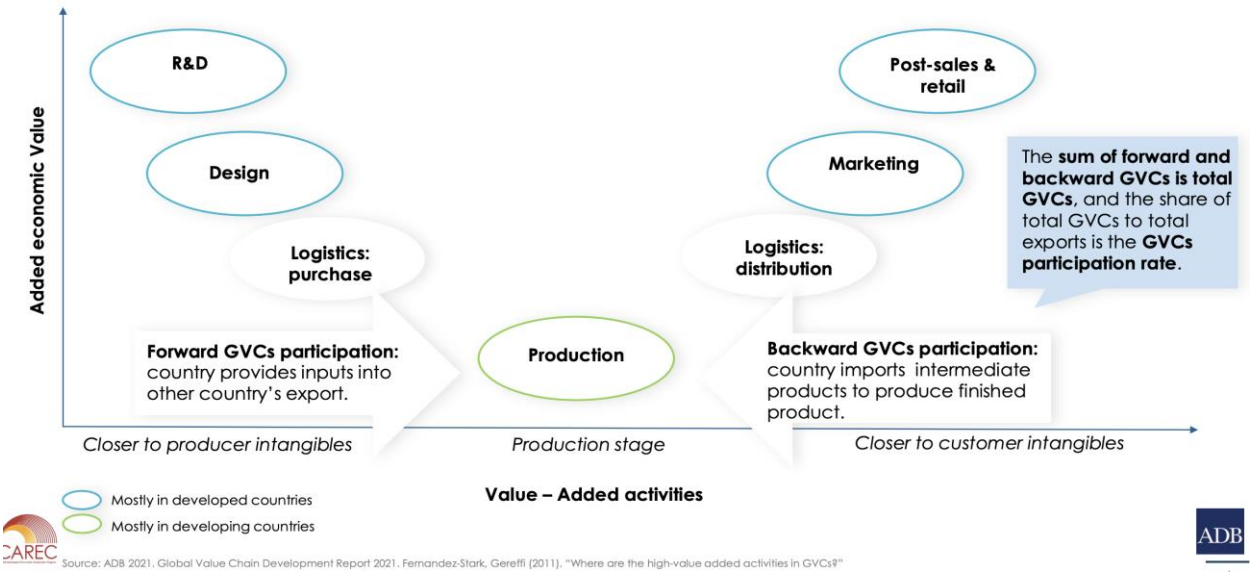


Figure *22*: Breakdown of forward and backward linkages in global value chains

In the CAREC region, the highest GVC participation rate was found in Mongolia with more than 50 percent of its gross exports involved in GVCs. Georgia and the Kyrgyz Republic have the second-highest GVC linkages. Kazakhstan's GVC participation differs from the previous three countries mentioned in that it has more forward GVC linkages. In contrast, Pakistan had fewer than 25 percent of its exports involved in GVCs. Having specialized in textiles, Pakistan exports mainly finished products that contain little imported inputs. The PRC has the most balanced GVC participation. In the CAREC region, we see that the rate of GVC participation is high, but it is mostly backwards GVC participation.

CAREC economies trade less than 1 percent with each other, which is comparably less than with their trade partners outside CAREC. The dynamics from the last ten years show that trade costs have reduced; however, if we compare this with other trade blocs, we see that trade barriers and costs are still relatively high. Export shares outside CAREC are absorbed by the Russian Federation receiving over 10 percent of the exports of Georgia, Kazakhstan, and the Kyrgyz Republic and the United States receiving over 20 percent of the exports of Pakistan. While the PRC is a major export and import partner for the other CAREC economies, its share in their trade is far lower than its size would suggest, resulting in a very low regional concentration index for the whole CAREC region.

A significant part of bilateral trade costs among CAREC members stems from non-tariff costs. The ADB's CAREC Corridor Performance Measuring and Monitoring (CPMM) in 2022 reported that trade barriers among CAREC countries are coming from regulatory and institutional barriers, such as unharmonized transit arrangements, vehicle specifications, and sanitary and phytosanitary (SPS) standards. To facilitate trade and reduce trade costs among CAREC, non-tariff barriers need to be significantly reduced.

CAREC member countries have high export concentrations and the majority of CAREC countries have the most concentrated exports in the world, with a large reliance on exports related to the primary sector. Most CAREC countries are positioned relatively upstream in GVCs; some sectors show higher than average forward participation. As of 2021, the most highly concentrated exports were in Azerbaijan and Turkmenistan, and more diversified exporters were in Pakistan and Georgia, after the PRC.

The Trade Complementarity Index (TCI) measures the extent to which the exports of one country and the imports of another complement one another. The median TCI in CAREC is 28.2, which is relatively small compared with ASEAN (42.3) and the European Union (67.4). Only a few countries have high TCI: exports from the PRC and imports from Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan; the Kyrgyz Republic's exports and Georgia and Tajikistan's imports.

The shift of employment, output, and trade shares from agriculture and manufacturing towards the service industries is happening globally. CAREC countries (excluding the PRC) are still weakly integrated in services GVCs. The rise in services GVCs offers a new path for development. To support integration into services GVCs, policymakers need to tackle obstacles to investment in human resources, since services GVCs depend more on human than physical capital.

The Kyrgyz Republic's garment industry is notable in its integration into GVCs. Most SMEs in the garment industry operate cut-make-trim (CMT) contracts. The design and branding activities are the most value-adding in the chain. The garment industry is 6 percent of the total exports of the Kyrgyz Republic. In 2019 the total exports of the textile industry amounted to USD 119 million (in 2020 it decreased to USD 63 million). Export markets are limited to two countries with nearly 90 percent of Kyrgyz textile products being exported to Russia and the rest to Kazakhstan. The garment industry employs about 9 percent of the total labor force. In 2019, an estimated 200,000 people worked in the garment manufacturing sector in the Kyrgyz Republic. Advancing in GVCs requires attracting foreign direct investment (FDI) and an enabling environment for the private sector; investments in human resources and skills training; as well as access to finance, expansion of markets, and upgrading of the operational capacities of firms.


JOHANNES F. LINN
SUAT BEYLUR

To meet climate goals, CAREC member states also need to decarbonize their supply chains. Most CAREC countries specialize in emission-intensive sectors, so CAREC has one of the highest shares of CO_2 emissions in the world in value-added manufacturing (Figure 23). Globally, trade facilitated by GVCs dominates in more emission-intensive sectors. Among CAREC, the most significant changes in GVC participation rates over the last decades have come from Mongolia and Kazakhstan. On a sector basis, mining and metals were the key drivers of this change in these two countries.

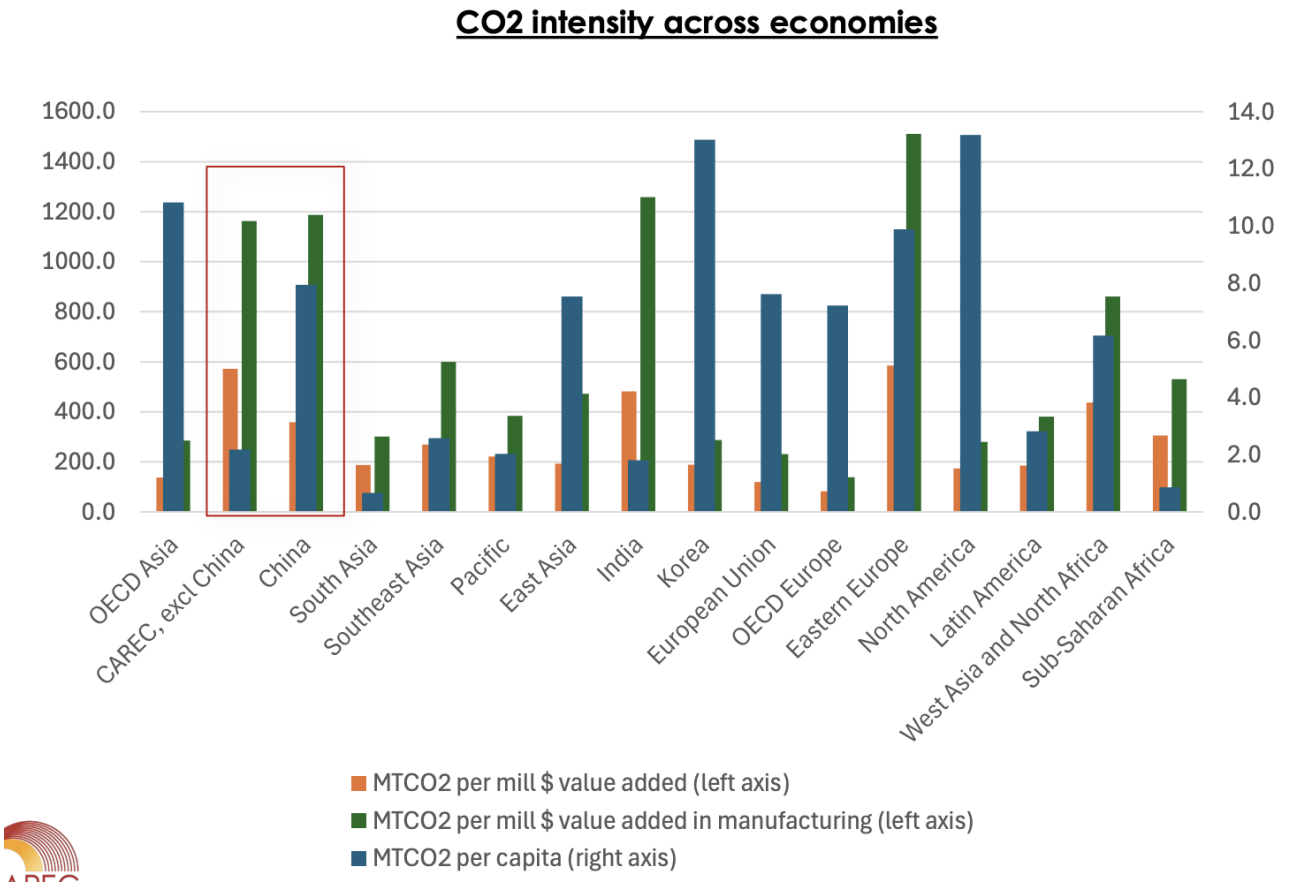


Figure 23: Comparative analysis of CO2 emissions in CAREC and global economies

Almost all CAREC members have vast resources of critical minerals, which gives them an opportunity to diversify their energy production and support their transition to clean energy. The PRC remains the strongest player in the global critical minerals supply chain. To move beyond mining, the region needs to think about harmonization to give more opportunity to the private sector to participate in clean energy manufacturing and generation.

Modeling scenarios to estimate the impact of the EU's CBAM on CAREC economies

Scenario 1	The EU imposes tighter ETS carbon allocations, with a resulting €100/MT price. CBAM taxes are imposed for ETS sectors at the same price as ETS (€100/MT).	100 €/MT CO2
Scenario 2	Not only the EU but all OECD economies impose tighter ETS carbon allocations, with a resulting €100/MT price. CBAM taxes are imposed for ETS sectors at the same price as ETS (€100/MT).	100 €/MT CO2
Scenario 3	CAREC economies impose a domestic carbon tax at a €50/MT. All OECD countries apply CBAM to CAREC at a partial rate, reflecting lower carbon price. CBAM taxes are imposed for ETS sectors.	50 €/MT CO2 OECD and 50 €/MT in CAREC

Note: During the phase-in period, the CBAM regime will not apply to all ETS sectors. However, the CBAM system is expected to be expanded to all ETS sectors after the phase-in period. There are discussions on expanded sector coverage. We do not model further ETS expansion here.

Table 5: Economic scenarios for CAREC under the European Union's CBAM

The participation of ASEAN's electric vehicle (EV) sectors in GVCs is a good example. In May 2023, ASEAN leaders issued a declaration on developing a regional EV ecosystem and establishing ASEAN as a global EV manufacturing hub. By unifying standards and promoting compatibility, ASEAN aims to streamline trade and create a cohesive EV market that transcends national boundaries. These initiatives also aim to promote knowledge exchange and enhance workforce skills.

Table 5 details the economic implications of the European Union's Carbon Border Adjustment Mechanism (CBAM) on CAREC economies, estimated using computable general equilibrium (CGE) modeling under three scenarios. CBAM with its current scope (six sectors) will have a mild impact on CAREC economies but the European Union is already signaling the possibility of expanding the scope of CBAM to more than five sectors. CAREC economies are not covered under the CBAM's scope 1 yet. There are about 30 jurisdictions already implementing environmental measures; there will certainly be indirect impacts. How CBAM may impact CO_2 emissions under scenario 3, with CBAM and domestic carbon pricing, will be a huge reduction in CO_2 emissions. Without domestic carbon taxes, these measures alone will not help the CAREC economies.

For CAREC countries with high (relative to OECD) CO_2 intensities in extractive sectors, CBAM could create a challenge. A shift to a price of €100 per metric ton of CO_2 under CBAM could lead to significant declines in exports and industrial production of CAREC countries in CBAM-covered sectors. The ten CAREC countries (excluding the PRC) are estimated to have the most substantial decline in total exports and in exports to the EU market. As many countries are moving away from emission-intensive energy sources to reduce their CBAM exposure, crude oil exports of the region could be indirectly impacted.

Changes in CO_2 emissions will be more than MNT 1,900 million CO_2 reduction globally if all OECD economies impose higher CBAM at 100 euro/MNT and CAREC economies impose domestic carbon pricing at 50 euro/MNT. The PRC is estimated to see a significant reduction in CO_2 emissions and contribute to global reduction under scenario 3. Increasing the carbon price and imposing CBAM in the EU and extending CBAM to other OECD countries without imposing carbon pricing in CAREC is estimated to increase emissions in all CAREC economies because of possible carbon leakage and downstream production shifting to CAREC economies under scenarios 1 and 2.

The way forward has many steps that need to be taken:

- Urgent cooperation on climate change and environmental risks—reinforcing mutual commitments to reduce climate change and environmental risk to GVCs and implementation of actions under the CCCV.
- Digitalization of trade processes—digitalizing trade processes will increase transparency and traceability in supply chains while at the same time promoting greening trade and making supply chains more adaptable and resilient.
- Regional standards on 'green value chains'—CAREC can encourage sustainable practices across their supply chains by reducing trade barriers on environmental goods and services and expanding access to green trade financing, particularly for small and medium-size enterprises (SMEs).
- A systematic effort to reduce trade costs, focusing on non-tariff costs—harmonize transport and vehicle standards; enhance customs efficiency and transparency; coordinate border-crossing operations; and implement national single window.
- Alignment of all stakeholders on the development of CAREC economic and transport corridors. CAREC is supporting the development and upgrade of six CAREC transport corridors to international standards, and economic corridor development, which will help link the region's key economic hubs to each other.
- Strengthen cooperation to attract investments to develop value-added manufacturing. Improving governance and investment regulations to attract investments for strategic technology and financial partnerships with countries and firms active in intermediate processing and downstream manufacturing.

The 'Regional Action on Climate Change: A Vision for CAREC' was approved during the 22nd Ministerial Conference, on 30 November 2023 in Tbilisi, Georgia. The first meeting of the steering committee was held in Astana on 29 May 2024. This document addresses the need to build strong knowledge, transfer of technology, and capacity in CAREC development member categories (DMCs) to address climate change impacts with a focus on cooperation. This document identifies goals, principles, and outcomes:

Goals

- Mitigate climate change
- Adapt to climate change
- Cooperate across borders

Principles

- Align with national strategies
- Deepen regional cooperation
- Expand coordination with development partners
- Include private sector/civil society
- Build an open regional platform

Outcomes

- Climate finance plans and instruments developed
- Coordination and synergies among development partners enhanced
- Project preparatory capacities improved
- Access to climate funds enhanced

- Disaster-risk financing instruments improved
- Innovative regional climate projects developed

The next steps in operationalizing the CCCV and mobilizing innovative financing instruments involve:

1. Facilitating high-level policy dialog—developing regional approaches and aligning countries' existing plans and strategies with international commitments under the Paris Agreement and the Sustainable Development Goals. Integrating climate objectives into the CAREC Integrated Trade Agenda and the mandate of the Regional Trade Group to identify common challenges and policy solutions to promote green trade and climate change mitigation and adaptation.

2. Promoting the exchange of knowledge, technologies, and best practices—ongoing initiatives such as the CAREC Advance Transit System and Information Common Exchange, and the digitalization of customs procedures by utilizing cutting-edge technologies are expected to result in lowering carbon emissions. GVCs can also contribute to lowering emissions by encouraging innovation and the exchange of green products and technologies. Understanding the impact of these interventions, and sharing experiences and lessons learned will be key for potentially scaling up existing initiatives and successfully designing and implementing new regional trade projects that support climate objectives.

3. Supporting mobilization of financing resources—increasing coordination and collaboration among development partners and the private sector to pool financial resources, share and transfer risks, and combine knowledge and technical expertise in planning and implementing climate-informed development programs or projects.

4. CAREC Climate and Sustainability Projects Preparatory Fund (CSPPF) to help address financing gaps and achieve climate change goals by supporting the preparation and readiness of regional projects for CAREC countries with a strong climate and sustainability focus.

In line with these initiatives, CAREC has launched the CAREC CSPPF. Figure 24 gives an overview of this fund and its activities/goals.

Critical raw materials (CRMs) in the CAREC region: need for a regional framework for sustainable extraction

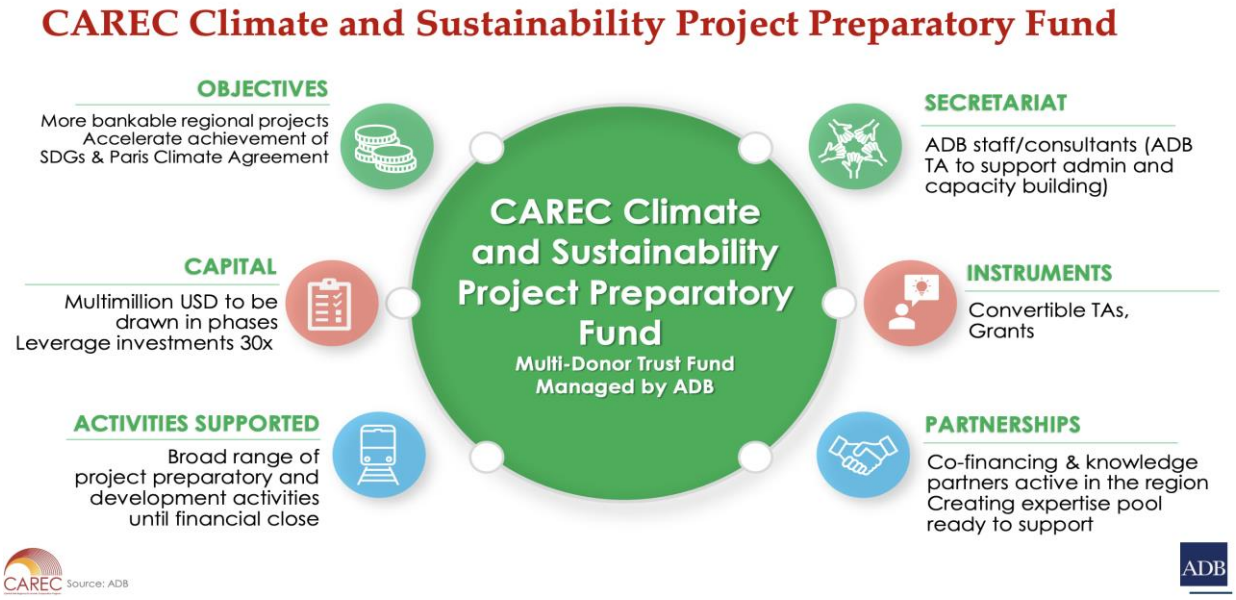


Figure 24: Overview of the CAREC climate and sustainability project preparatory fund

Speaker: *Roman Vakulchuk, Head of Climate and Energy Research Group, Norwegian Institute of International Affairs (NUPI), Oslo, Norway*

The demand for CRMs is set to explode and it raises the importance of regions such as CAREC for these critical materials. It is likely one of the least covered areas when it comes to climate change and green transitions and data on critical materials is not easily available. However, the results for this region are quite promising. This research/study was carried out by NUPI and looked at four countries—namely Kazakhstan, Uzbekistan, Tajikistan, and Kyrgyzstan. The potential for each of these countries when it comes to CRMs is quite high.

Kazakhstan has the highest potential with 18 out of 22 CRMs present; out of these 18, the geological potential for 16 of these CRMs is high. The other three countries identified also have many critical minerals, which are available in significant quantities. However, it must be noted that the data is not truly comprehensive and there is still a lot of potential for geological exploration, which means more finance can go into this area to calculate accurate results. In Kazakhstan, there are many new initiatives in this respect. The CAREC region is endowed with reserves of CRMs (see Table 6).

CAREC region is endowed with critical materials
38.6% of global manganese ore reserves
30.07% of chromium
20% of lead
12.6% of zinc
8.7% of titanium
5.8% of aluminum
5.3% of copper
5.3% of cobalt
5.2% of molybdenum
4.8% of iron ore
1.2% of nickel
1.2% of silver

Table 6: Critical material reserves in the CAREC region

One unique feature of Central Asia is the availability of different minerals, which are in close deposit areas next to each other; this is similar to, for example, the lithium triangle in Latin America. In this regard, it is unique for potential investors. However, there are certain risk factors in the CAREC region:

- Aging mining infrastructure
- Mining and environment
- Critical materials as a barrier to or an opportunity for economic diversification
- Investment climate

Critical materials can become an important source of economic diversification and, in this, it presents an opportunity. The production of CRMs taken together creates more than 20 opportunities for other industries. So, there are significant positive impacts. However, there is also the risk of this again becoming a resource curse because if new value chains are not added, the situation will not be ideal for these countries. High sustainability standards should be maintained.

At the bilateral level, China is one of the main importers from Central Asia and the Belt and Road Initiative (BRI) has been a key component of this process. China is one of the largest investors in new mining projects. Chinese companies own a large share of CRM extraction licenses in Kyrgyzstan (nine companies) and Tajikistan (eight companies) and we can see the rapid increase in these imports from Kazakhstan in Figure 25.

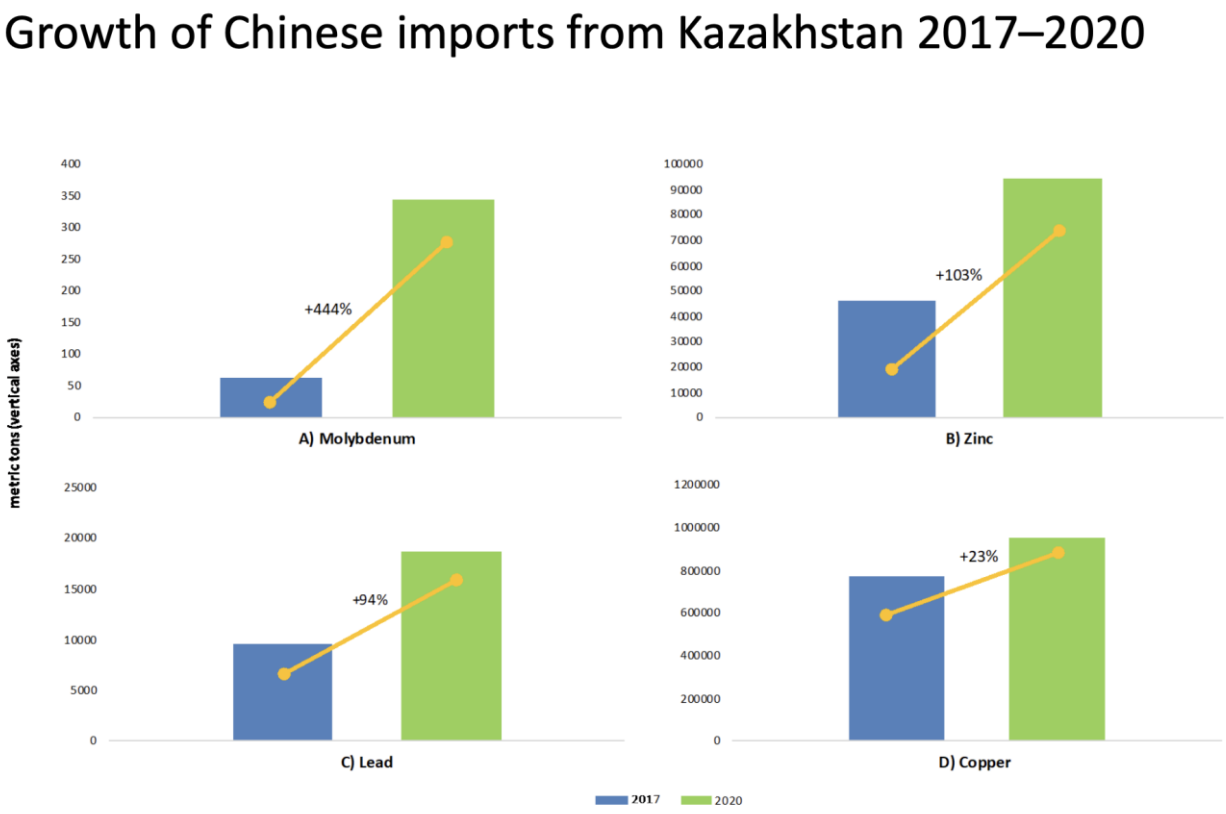


Figure 25: Trends in China's imports of molybdenum, zinc, lead, and copper from Kazakhstan

Central Asian countries have also signed strategic agreements with the United States and the European Union. The European Union signed a strategic agreement with Kazakhstan in 2022 in the field of raw materials, batteries, and renewable hydrogen. The United States has launched a C5+1 critical minerals dialog with Central Asian countries, which 'will provide a forum in which the C5+1 can catalyze investment and collaborate on critical minerals supply chains' with assistance from the Development Finance Corporation and the US Export–Import Bank. The Eurasian Resources Group (ERG) in Kazakhstan recently signed a five-year contract with Evolution Energy (US) for the supply of cobalt hydroxide. Evolution Energy is a manufacturer of materials for electric car batteries and the first deliveries from this project will begin in 2026. ERG has also signed a contract with a Chinese company (BGRIMM Technology Group) for Cobalt mining in Congo.

There are some major risks when it comes to sustainable extraction and CRM supply chains:

1. External shocks—natural disasters, pandemics, wars, mine accidents, and so on.
2. Resource nationalism—tax disputes, expropriation, foreign investment screening, and so on.
3. Export restrictions—export quotas, export taxes, obligatory minimum export prices, licensing, and so on.
4. Mineral cartels—coordination of production, pricing, market allocation, and so on.
5. Political instability and social unrest—labor strikes, violence, corruption, and so on.
6. Market manipulation—short squeezing, market cornering, spoofing, insider trading, and so on.

Another significant factor in mining is the number of years it takes to develop a mine from first discovery to production. There is a substantial period required and, even if the opening of new mines is fast tracked, it will still take a long time. These periods are even longer in advanced economies where regulations and protocols are a lot stricter. Global averages show that the time required is quite significant. Therefore, it is important to prioritize the development of new mines.

Many Central Asian countries have large mining sectors and they need to enhance their capacity in transportation, processing, efficiency of use, recycling, and InterTech substitution. Currently, CAREC members often miss out on high margins.

In conclusion, it is just bilateral relations between states that are an obstacle to having regional, high-tech supply chains, especially along the lines of making CRM an important source of economic diversification. Now is the time to make these changes as CAREC could be a one-stop shop for these needs. The issue of data gaps is huge, so it is important to create such a platform for countries to be able to collaborate in this region.

CAREC climate change action plan: integrating climate change into CAREC Program themes

***Speaker**: Khalid Umar, Regional Cooperation Specialist, CWRC, ADB*

CAREC is an open and inclusive platform working together—for over 22 years—to promote sustainable development through regional cooperation. CAREC comprises 11 countries: Afghanistan, Azerbaijan, PRC, Georgia, Kazakhstan, Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan. CAREC's development partners include the Asian Infrastructure and Investment Bank (AIIB), the European Bank for Reconstruction and Development (EBRD), the IMF, the Islamic Development Bank (IsDB), the United Nations Development Programme (UNDP), and the World Bank.

The overarching vision of CAREC is 'Good Neighbors, Good Partners, and Good Prospects.' The ADB serves as the CAREC Secretariat. CAREC convenes regional policy dialog, supports project development and financing, provides technical assistance, and promotes South–South cooperation. CAREC also assists its member countries in adapting to global initiatives like the SDGs, Paris Agreement, Conference of Parties (COP), regional challenges, and national priorities. CI supports knowledge generation and capacity building. CAREC has a rotating chairmanship annually, with Kazakhstan as the country chair for CAREC in 2024, the next chair will be the Kyrgyz Republic in 2025.

CAREC is currently guided by the CAREC 2030 Strategy which can be seen in Figure 26.

Figure 26: CAREC 2030 Strategy

To ensure CAREC's effectiveness, relevance, and responsiveness, the following plans and priorities were set out for 2024:

- Midterm review of CAREC 2030 Strategy
- Implementation of CAREC's Climate Change Vision
- Establishment of CAREC Climate and Sustainability Project Preparatory Fund
- Proposed CAREC Infrastructure Investment Forum
- Development of pipeline of innovative regional projects

Furthermore, key events were planned for 2024:

- Senior Officials Meeting (30-31 May, Astana)
- National Focal Points Meeting (Oct, virtual)
- Ministerial Conference (8 Nov, Astana)
- COP29 Summit (11-24 Nov, Baku)—potential CAREC session

The long-term roadmap for CAREC can be seen in Figure 28.

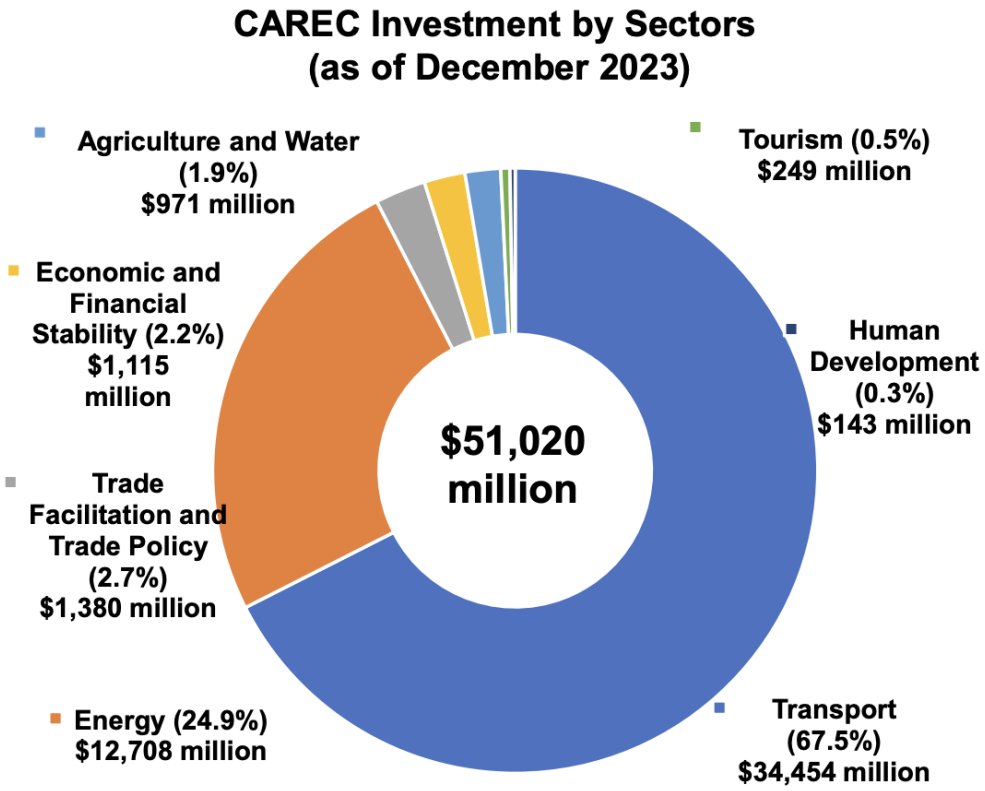


Figure 27: Sectoral allocation of CAREC's investment portfolio

CAREC also has a significant investment portfolio and from 2001 to the end of 2023, USD 51.02 billion worth of CAREC-related investments have been made, covering 276 projects. Of this, more than USD 17.6 billion has been financed by ADB, around USD 23.37 billion by other development partners, and USD 10.05 billion from CAREC governments. Figure 27 shows CAREC investment by sector.

In April 2023, CAREC published a scoping study titled, 'CAREC 2030: Supporting Regional Actions to Address Climate Change.' This study identified that there is an increasing incidence, frequency, and severity of natural disasters in the region along with devastating floods, droughts, and cross-

border tensions over water resources. Furthermore, rising global temperatures are disproportionately affecting the CAREC region and, as a result, there is also a loss of natural capital (melting glaciers, loss of freshwater resources). The study recommended that CAREC should 'chart a course of strategic engagement in supporting its member countries in reinforcing, modifying, and implementing existing national strategies on climate change' and 'develop a range of regional actions in response to the regional nature of many climate change impacts and solutions.'

In November 2023 CAREC published a document titled 'Regional Action on Climate Change: A Vision for CAREC.' This document outlined CAREC's Climate Change Vision statement which was 'a region of sustainable development, shared prosperity, and climate resilience.' This document was officially endorsed at the 22nd CAREC Ministerial Conference 2023 in Tbilisi, Georgia.

The document develops principles for pursuing climate actions across CAREC sectors by identifying priority investment areas and identifies climate change as a cross-cutting priority area under the CAREC 2030 Strategy. It also proposes steps and institutional arrangements to achieve more sustainable and climate-resilient growth by building on over 20 years of successful support to its developing member countries (DMCs) with the assistance of a growing number of multilateral and bilateral development partners. CI can drive a solid knowledge base and capacity building in sector and thematic areas with a regional focus on climate change and the CAREC Program can provide technical assistance and investments for regional solutions, establish regional frameworks for enhanced project design and financing, and support regional policy coordination. This document also put forward three goals and five key principles listed as follows:

Goals

- Mitigate climate change
- Adapt to climate change
- Cooperate across borders

Principles

- Align with national strategies
- Deepen regional cooperation
- Expand coordination with development partners
- Include private sector/civil society
- Build an open regional platform

To bring CAREC's Climate Change Vision to life, the CAREC Working Group on Climate Change has been established (WGCC), which includes representatives from CAREC countries and development partners. The first virtual meeting was held (virtually) on 26 April 2024, and its ToRs were endorsed with the coordination and support of the CAREC secretariat. The WGCC will translate the CCCV into a Climate Change Action Plan (CCAP) by integrating climate change in regional projects, CAREC clusters, and initiatives, aligning with national NDCs and NAPs, and prioritizing climate adaptation. WGCC has already identified key AP areas for climate change integration during a meeting in Astana on 29 May during which members also shared ongoing climate change initiatives and discussed financing of regional climate projects. WGCC also held focused discussions with CAREC subgroups to define outcomes, outputs, and regional projects and activities of the Action Plan, which were virtually held on 8 July. A draft action plan will be discussed by the WGCC in Baku

in early September, and the finalized action plan will be presented at the CAREC Ministerial Conference on 8 November in Astana, Kazakhstan.

Figure 28: Timeline of CAREC 2030 Strategy implementation

The CAREC CCAP has four key proposed areas:

1. Climate risk, preparedness and health—climate risk assessment and infrastructure, regional early warning platform and heatwave preparedness, disaster risk management and financing, and air pollution.
2. Water–energy–food security nexus—glacier melting impact assessment, water forecasting and climate-smart agriculture.
3. Low-carbon growth—decarbonization of transport corridors and trade, grid readiness and renewable energy integration
4. CAREC climate platform—regional information sharing, climate finance, capacity development, and COP.

In order to bring CAREC's Climate Change Vision to light, the CAREC Climate and Sustainability Project Preparatory Fund (CSPFF) is going to be launched. The objective of this fund is to address and narrow CAREC countries' financing gaps in achieving climate change actions and SDGs through the preparation of bankable climate and SDG-related projects. The priority of the fund is to back regional projects guided by the seven priority sectors/areas of the CCCV by using funds to support sovereign operations through technical assistance and grants. CSPFF is a multitrust fund to be administered by ADB, with contributions from bilateral, multilateral and other sources, including member countries and development partners (Financing Partners). The steering committee will be chaired by the Director General, of the Central and West Asia Department of ADB. The Regional Cooperation and Integration Unit (CWRC) will act as the Fund Manager and regular consultation meetings will be held with financing partners.

Finally, CAREC is also going to present at COP29. All countries have initiated preparations and some countries will have or are considering their own pavilion (PAK, UZB) or shared pavilions (KGZ shared with mountainous regions). CAREC has proposed sessions and side events, which include the launch of CSPPF and the CAREC Climate Change Action Plan, including key initiatives like the CAREC Regional Early Warning System, Regional Climate Risk Assessment and Resilient Infrastructure Planning, and the CAREC Partnership for Climate, Innovation and Trade (Green Aid for Trade, link with Baku Initiative for Climate Finance, Investment and Trade (BICFIT) Dialogue). Furthermore, capacity-building support on climate negotiations is to be provided to WGCC members in September in Baku.

SESSION IV: CTTN RESEARCH GRANTS PROGRAM PRESENTATIONS: FROM IDEAS TO IMPACT: ACCELERATING CLIMATE SOLUTIONS THROUGH INNOVATIVE DEVELOPMENT

The RGP is designed to support CTTN member think tanks to produce policy research on topics of regional significance to add value to the regional body of knowledge, promote and facilitate collaboration among member think tanks to work jointly on regional issues, and provide a regional platform to national think tanks to present their research output at the annual think tank development forum. In this session, RGP researchers will present preliminary findings of their research studies on topics closely aligned with the forum's thematic focus. Each researcher will present their findings for 10 minutes, followed by participants' feedback and open discussion for 30 minutes.

***Moderator**: Dr Siddarth Saxena, Chairperson, Cambridge Central Asia Forum, UK*

Innovative perspectives: exploring opportunities in emissions trading systems for CAREC countries

***Speaker**: Giorgi Khishtovani, Research Director, PMC Research Center, Georgia Climate*

The impact of climate change is becoming increasingly prominent and it has evident consequences, which include:

- Extreme weather
- Rising sea levels
- Disrupted ecosystems
- Increasing economic loss

In the case of Central Asia, it is heavily reliant on fossil fuels and is highly vulnerable towards climate change. Climate change in Central Asia poses serious threats to growth, prosperity, and sociopolitical stability. It also has a disproportionate effect on vulnerable groups, poverty, and inequality. Current mitigation efforts in Central Asia include CAREC countries' NDCs submitted to UNFCCC and decarbonization targets and green economy strategies. Only China and Kazakhstan are implementing emissions trading systems (ETSs). However, to be more efficient there is a need for coordinated approaches and joint resource management. In this light, ETSs and their linkages arise as globally established effective mechanisms for mitigating climate risk.

This research aimed to address the complexities of linking emission trading systems (ETS) and identify opportunities and potential benefits within the CAREC region and had five main objectives:

- Objective 1: Mapping ETS landscape in CAREC countries
- Objective 2: Exploring regional ETS linking
- Objective 3: Identifying opportunities and challenges

- Objective 4: Assessing applicability of ETS linking in CAREC
- Objective 5: Providing policy recommendations

Linking occurs when two or more ETS systems are interconnected in a manner that allows participants in one system to use compliance instruments (that is, allowance) issued by the administrators of any linked system to meet their regulatory obligations. The types of ETS linking can be seen in Figure 29.

The economic rationale of linking ETS holds that linking facilitates gains from trade by leveraging differing abatement cost curves across countries. Linking also leads to price convergence, lowering the aggregate compliance costs of reducing GHG emissions.

The advantages of linking ETS are that it increases market size, improves liquidity and reduces price volatility. A larger network is also better equipped to absorb shocks, promoting stable pricing. Linking also reduces carbon leakage risks by creating a unified regulatory environment. Another advantage is that linking reinforces political commitment to climate action, making it harder to backtrack on environmental targets. Of course, there are also some risks with linking ETS. There is the risk of reduced innovation incentives owing to lower allowance prices and there is the potential for smaller systems to set less ambitious caps. There is also a risk that countries may lose some control over domestic policy owing to the need for coordination with partners. Finally, there is the risk of 'imported risk.'

There are several enabling factors of ETS linking in the CAREC region, which can be primarily broken down into environmental ambitions, economic composition, and political and economic cooperation.

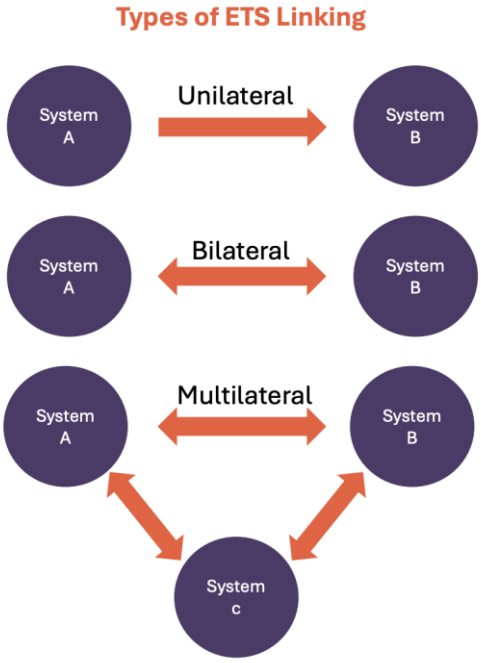


Figure 29: Approaches to linking emissions trading systems

Environmental ambitions

Environmental ambitions are based on unconditional GHG emission reduction targets. China stands out as the sole country in this group, making it a potential leader in regional ETS linking initiatives. Countries with moderate environmental ambition could be potential partners for China or the EU in future linking endeavors, provided they strengthen their ETS infrastructure and regulatory

frameworks. Linking low-ambition countries might not result in substantial overall emission reductions. In CAREC there are three groups of countries in terms of environmental ambition:

- Low ambition—Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, and Turkmenistan.
- Moderate ambition—Azerbaijan, Georgia, Tajikistan, and Uzbekistan.
- High ambition—China.

Economic composition

Agriculture dependent economies—more than 20 percent in GDP, relatively low energy and carbon intensity, reliant on agricultural exports. Agriculture-dependent economies could potentially benefit from linking with partners who have complementary economies, such as those with strong service sectors, to diversify their economies and gain access to new markets.

Energy-intensive industrial economies—more than 30 percent in GDP, high energy and carbon intensity, reliant on energy exports. Energy-intensive industrial economies 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—balanced percentage of agriculture, industry, and services in GDP, varying levels of energy and carbon intensity. Diversified economies have more flexibility in choosing linking partners, as they can prioritize either economic complementarity or environmental ambition depending on their specific goals and priorities.

Political and economic cooperation

Higher coordination in common ETS Frameworks can be facilitated by established economic and political cooperation. The examples of strong economic ties in the CAREC region through RTAs are:

- Georgia with China, Azerbaijan, Kazakhstan, Turkmenistan
- Azerbaijan with Kyrgyzstan, Kazakhstan
- Kazakhstan, Kyrgyzstan, Uzbekistan
- Pakistan and China

On this note, the implications of existing political and institutional frameworks for ETS linking can be:

- Facilitation of negotiations and implementation of cross-border carbon markets
- Creation of an effective regional approach to climate change mitigation
- Contributions to integrated regional climate change mitigation

The major challenges of linking ETS are listed below:

- Resource and time intensiveness of linked ETS infrastructure
- Harmonization of monitoring, reporting and verification (MRV)
- Lack of technical expertise and capacity
- Economic and political variabilities on national and regional levels
- Challenging regulatory alignment
- Economic structures divergence
- Private sector and public acceptance
- Insufficiency of financial resources

In conclusion, this study came up with the following nine findings and recommendations:

1. There is insufficient understating and support of linked ETS benefits. The recommendation here is to communicate the benefits of linked ETS.
2. Technical gaps and low awareness impede ETS implementation. The recommendation here is to enhance technical capacity and awareness for effective ETS implementation.

3. There is inconsistent knowledge sharing and experience within the region. Knowledge exchange needs to be facilitated in the CAREC region.
4. There is insufficient dialog on ETS among CAREC countries. The CAREC platform needs to be utilized to foster dialog on ETS linking.
5. A lack of continuous strategic alignment and collaborative engagement on ETS linking means that there needs to be a collaborative roadmap for climate change mitigation through ETSs.
6. There are high complexities associated with immediate regional ETS implementation and there needs to be a phased approach for linked ETSs.
7. Diverse ETS frameworks hinder regional integration, which means that there should be harmonization in the implementation of national ETS frameworks.
8. The optimal partnerships for ETS linkages are unclear. In this regard, individual quantitative modeling needs to be conducted for optimal partnership identification.
9. Finally, there are technical challenges and constraints in ETS initiatives. CAREC countries need to seek international support for cooperative ETS initiatives.

Climate change in Kazakhstan: state policy and public awareness (10 minutes)

***Speaker**: Azimzhan Khitakhunov, Senior Research Fellow, Eurasian Research Institute of the Khoja Akhmet Yassawi International Turkish–Kazakh University, Kazakhstan*

State policy

Kazakhstan has a national strategy that also has elements meant to combat climate change, which is called 'Kazakhstan 2050.' This strategy contains policies on organic products and environmentally friendly production by mining enterprises. The concept for a transition to a green economy includes a reduction in GHG emissions and the energy intensity of GDP, abandoning coal-fired power generation and increasing the share of renewable and alternative energy sources. Kazakhstan also has a national environmental code, ensuring the environmental foundations for sustainable development. Furthermore, there is also a strategy to achieve carbon neutrality by 2060.

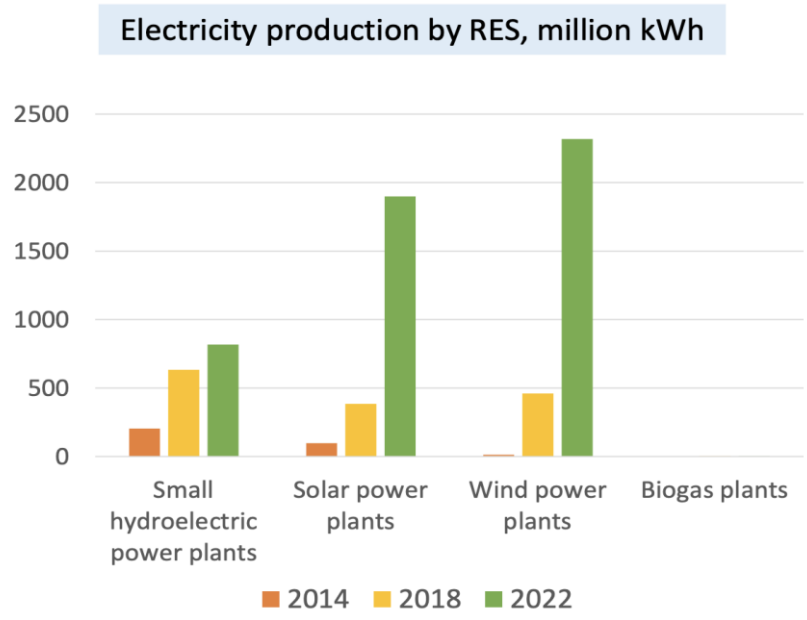


Figure 30: Growth in renewable electricity production in Kazakhstan, 2014-2022

The share of renewable electricity sources (RES) has gone up substantially from 2014 to 2022 (Figure 30) with the share of RES in total electricity production, excluding large hydroelectric power plants, being 4.44 percent in 2022. Similarly, environmental investment has also gone up substantially from 2016 (see Table 7).

Environmental investments, million USD

	2016	2017	2018	2019	2020	2021	2022
Investments aimed at protecting the environment, out of which	128	267	322	519	420	402	347
Internal investments	94	182	248	153	255	216	219
Share	*74%*	*68%*	*77%*	*30%*	*61%*	*54%*	*63%*
Foreign investments	34	85	75	366	166	186	127
Share	*26%*	*32%*	*23%*	*70%*	*39%*	*46%*	*37%*

Table 7: Trends in environmental investments in Kazakhstan, 2016-2022

The number of scientific and technical projects on the green economy and their financing (tenge) has also gone up, although the number of projects itself has decreased, the financing for these projects has gone up. Furthermore, the share of expenditure on green economy projects in total R&D expenditure has also gone up from 2018 to 2022.

Kazakhstan's national policy is based on some strategic documents, all of which support increasing the share of renewable energy sources. Simultaneously, they support measures to attract FDI, create employment opportunities, and support climate research.

The results of these measures and citizens' views on them have been documented as part of this study, through a survey, which also formed the main part of this research.

The survey reached 404 respondents, ensuring a diverse representation of the community. Participants were asked a series of questions, with the primary focus being their awareness of climate change. For further analysis, only the responses from those who answered 'Yes' were considered. This subgroup of 368 respondents represents the population segment aware of climate change. Out of the 404 respondents:

- 368 (91.1 percent) answered 'Yes'
- 24 (5.9 percent) answered 'No'
- 12 (3.0 percent) answered 'Don't know'

All the questions and respondent answers can be found on the CAREC website at the following link: https://estore.carecinstitute.org/wp-content/uploads/2024/09/2-Change-in-Kazakhstan-State-Policy-and-Public-Awareness-Azimzhan.pdf

Optimizing financial architecture by overcoming challenges to implement emissions trading mechanisms in the CAREC region (10 minutes)

***Speaker**: Ummara Razi, Lecturer and Research Associate, ILMA University, Pakistan*

Immediate action is needed because of severe threats to ecosystems, economies, and societies (Rogelj et al, 2016). The Paris Agreement (2015) aims to limit global temperature rise to below 2°C, ideally 1.5°C. Annual COP meetings are driving international collaboration and policy innovation for climate action Sustainable Development Goal number 13.

Carbon pricing mechanisms

- Carbon tax: These are direct taxes on carbon emissions, incentivizing reduction at the source.
- Cap and trade (ETS): Sets a cap on total emissions and allows trading of emission allowances.

Emissions trading mechanisms

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

Economic impact, and environmental benefits

- CPMs and ETMs generate revenue, which is reinvested in green transition projects and supports economic transformation (Cai & Ye, 2022).
- They also create socioeconomic spillovers which contribute towards building green economies.
- ETMs drive innovation in high-emitting sectors like power generation, manufacturing, and transportation.
- They also encourage the development and adoption of low-carbon technologies.

There are currently 36 emissions trading systems in force covering over 9.9 Gt of CO_2 emissions, which equates to over 18 percent of global emissions. In 2023, USD 74 billion was raised through ETSs, totaling almost USD 303 billion since 2007. Furthermore, 18 ETSs are currently under development and eight more are under consideration. Almost one third of the global population lives under an ETS in force and jurisdictions making up 58 percent of global GDP are using emissions trading.

Figure 31 shows the status of emission trading in CAREC countries.

Figure 31: Status of emission trading systems in CAREC countries and Asia

Study motivation

- 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.

Objectives

The objectives of this study were to identify challenges through a comparative analysis of existing ETMs in CAREC and other regions. The objective was to analyze 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

The data used was sourced from various international databases and reports. Purposive sampling was used as a strategy to select countries with active ETMs. The ETMs selected included the European Union (EU ETS), New Zealand, South Korea, China, and Kazakhstan. The data was analyzed using comparative analysis to compare countries from diverse economic contexts and ETM statuses to facilitate a comprehensive analysis. The advantages of comparative analysis were that comparative analysis allowed focus on adaptability, performance, and the challenges of ETMs across different regions. Key insights were provided, identifying best practices and common challenges to inform policy recommendations. The study was also able to identify how regional,

financial, economic, and regulatory conditions influence ETM success. Finally, the studies empower stakeholders to refine mechanisms, design efficient new systems, and pursue collaborative regional strategies.

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

Figure 32: Economic and emission profiles of selected countries and energy transition mechanisms

Figure 32 provides economic data and an emissions overview for countries and ETMs that were selected for the study.

The comparative analysis of the ETMs selected provided insight into the main features and factors that allowed these ETMs to succeed. Among the success factors of these ETMS were the emissions covered, allowances and allocation efficiency, compliance rates, and total revenue generated. Financial architecture optimization is also important in ETM success and efficient pricing mechanisms, funding and subsidies, access to green finance, and investment in renewable and low-carbon technologies are all crucial factors. Another main area identified was stakeholder engagement and, in this regard, it is important to increase awareness, provide capacity building, ensure participation rates, and provide feedback mechanisms. Regulatory support enables an infrastructure to be in place, which is extremely important for an ETM to flourish. Regulatory support means the provision of a legal framework, alignment with national policies and goals, and international cooperation. Finally, technological infrastructure needs to be in place for an ETM to function, which means that effective measurement, reporting, and verification (MRV) systems should be in place, platforms to facilitate trade must be set up, and there should be systems in place to support and assist innovation in the ETM sphere.

Table 8 provides an overview of the comparative analysis of successful ETS systems that are currently operational.

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 Mt CO2e (% 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

Table 8: Comparison of ETS features in selected regions

Table 9 provides an outline of the financial optimization measures taken in the selected regions and countries to support ETMs and the efficiency of their revenue collection etc.

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

Table 9: Financial infrastructure of selected ETM systems

The legal and political environment is also important when it comes to ETM architecture and ETS efficiency in a jurisdiction. This aspect was measured in the study and the most favorable environment was in New Zealand, followed by the European Union, South Korea, China, and Kazakhstan in that order. High scores in New Zealand and the European Union indicate that the legal environment is conducive to enforcing and sustaining their ETMs. Kazakhstan's score indicates that there is still room to strengthen its legal and political framework.

Table 10 provides information about the technological infrastructure in place in the five ETM systems identified by looking at three main aspects—MRV systems, trading platforms, and innovation support.

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

Table 10: Technological infrastructure and innovation support in selected ETM systems

Following the comparative analysis across various areas, the main challenges—regarding ETM development, efficiency and so on—were identified; these are important for all those looking at developing or improving their own ETM systems. The main challenges are as follows:

1. Cap stringency: difficulties in setting and maintaining stringent emission caps owing to varying economic conditions and emission profiles in the CAREC region.
2. Insufficient market liquidity hampers effective trading and price discovery within the emission trading systems.
3. Allowances allocation: challenges in fair and efficient allocation of emission allowances, leading to market distortions and inefficiencies.
4. Regulatory and policy gaps: inconsistencies and gaps in regulations and policies create uncertainty and hinder the smooth operation of ETMs.
5. Inadequate market infrastructure, such as trading platforms and data management systems, limits the effectiveness of ETMs.
6. Limited stakeholder awareness and capacity among key stakeholders reduce engagement and compliance with ETM requirements.
7. The absence of robust monitoring, reporting, and verification (MRV) systems undermines transparency, trust, and accountability in the emission trading process.

Finally, the following policy recommendations are very useful for a range of actors—including legislators, think tanks, and international organizations—involved in this sphere:

1. 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.
2. Improve emission allowance allocation—transition from free allocation to auctioning to enhance efficiency and transparency, implement a phased plan to increase auctioned allowances annually, and introduce market stability mechanisms to manage price volatility.
3. Enhance carbon pricing—gradually increase carbon prices to reflect the true cost of emissions, set an initial floor price, prepare a multiyear schedule for gradual increases, and adjust carbon prices based on economic conditions like inflation and GDP growth.
4. 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; and establish stringent compliance mechanisms including audits and real-time emissions monitoring.
5. Increase financial incentives and support—provide subsidies for investment 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.
6. 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; and enhance market liquidity and participation by reducing entry costs and complexities.
7. Foster stakeholder engagement—organize workshops, seminars, and consultation forums for feedback and collaboration; publish regular ETM progress reports; and collaborate with NGOs and academia.
8. Promote market readiness and international integration—harmonize domestic ETM regulations with international standards; establish bilateral or multilateral agreements for broader market access; and adopt global verification and compliance practices to facilitate integration.

Designing policy support for climate-smart trade in the CAREC region

***Speaker**: Hadiqa Tanveer, Lecturer, Bahria Business School, Pakistan*

Introduction

Climate change poses a significant threat to human civilization and economic development. International trade, when aligned with sound environmental policies, can help countries mitigate and adapt to climate change. Trade-led growth has lifted millions out of poverty, providing market access, technology transfer, and investment opportunities. However, increased production and trade have led to the overuse of resources, increased emissions, and inequality. CAREC member countries are required to reduce GHG emissions by 10 percent to 20 percent by 2030. Implementing innovative approaches to reduce industrial pollution and shifting towards greener production and trade to comply with environmental regulations is imperative. To address these challenges and promote sustainable development, the CAREC region is implementing a variety of climate-smart goods.

Policy relevance and objectives

Balancing economic development with climate imperatives is essential for effective regional climate policy. As of 2022, trade—constituting 35 percent of the combined GDP of the region—serves as a vital driver for development and integration among countries. A study conducted by the ADB in 2023 on climate initiatives reveals a predominant emphasis on energy-related projects among previous climate change initiatives in the region. It highlights a notable gap concerning the intersectionality of climate policies and trade dynamics.

Climate–trade nexus

One of the objectives of this study was to examine the impact of public regulations and voluntary compliance on the climate–trade nexus in the region. Environmental taxes reduce greenhouse emissions by internalizing the external cost of pollution. Free trade agreements (FTAs) with climate-relevant provisions can harmonize regulatory standards and promote sustainable trade practices. Climate provisions in non-tariff measures (NTMs) shape international trade patterns by ensuring that traded goods meet specific environmental criteria. The use of digital technologies enhances transparency, improves compliance tracking, and supports the integration of environmental considerations. Ocean acidification and rising sea-levels pose significant threats to marine ecosystems and coastal communities, highlighting the need for robust adaptation measures. Green patterns and technological innovations are crucial for advancing cleaner technologies and reducing the environmental footprint of economic activities. Carbon footprint and CO_2 emissions influence global climate patterns and necessitate comprehensive mitigation strategies. Regional trade agreements (RTAs) often incorporate environmental provisions to harmonize regulatory standards and promote sustainable trade practices. Bilateral trade factors are influenced by environmental regulations and climate conditions, affecting the competitiveness and sustainability of economies.

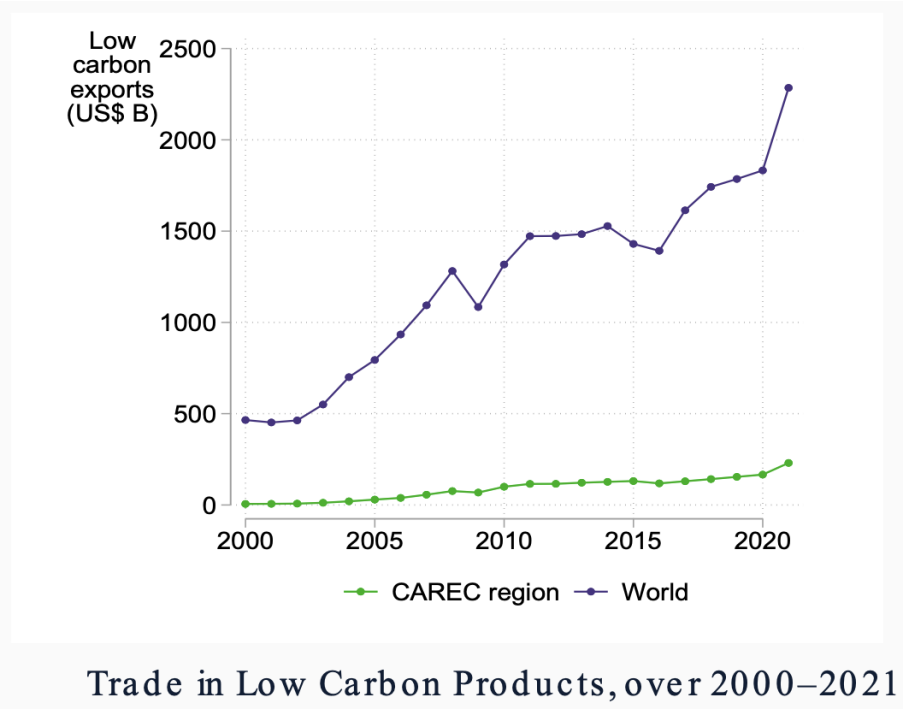


Figure 33: Low-carbon export trends in the CAREC region and globally, 2000-2021

Figure 33 clearly shows that the CAREC region is lagging far behind the rest of the world when it comes to low-carbon exports.

Within the CAREC region China, Georgia, and Kyrgyzstan are leading the way when it comes to their total trade in low-carbon products as a percentage of GDP; they also have a significant comparative advantage (see Figure 34).

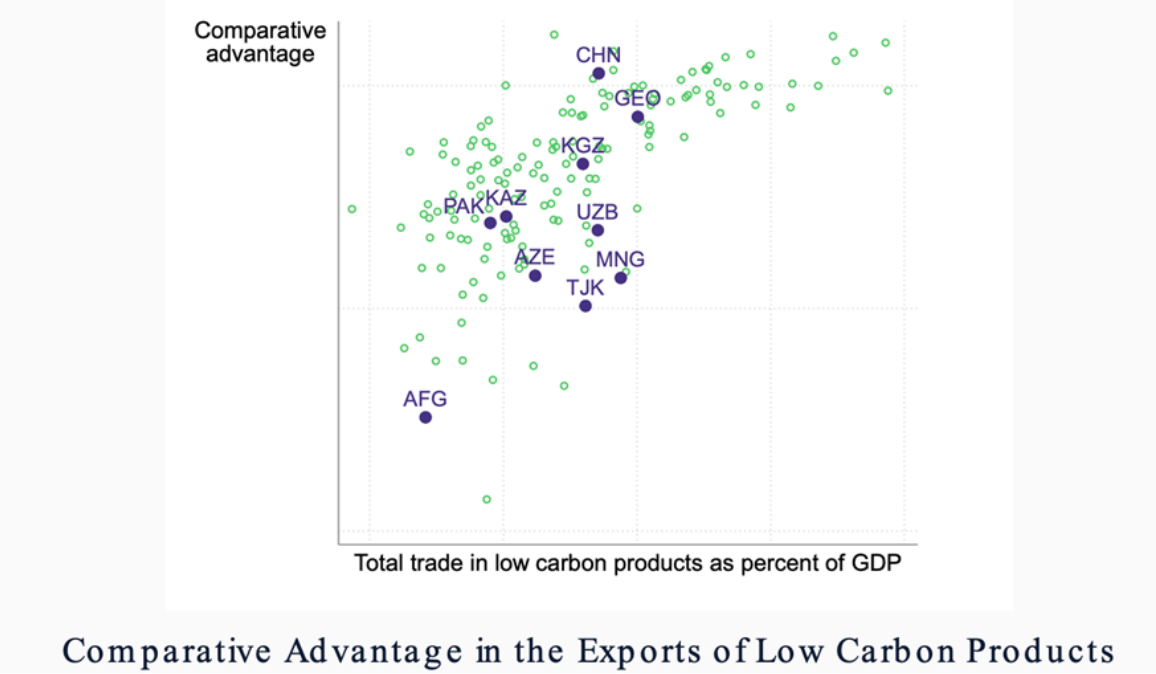


Figure 34: Export competitiveness in low-carbon products in the CAREC region

Table 11 provides an overview of the trade in low-carbon technology products for the entire CAREC region.

Low-Carbon Technology Products: Trade

Country	Low-carbon exports (million US$)	Low-carbon exports share of total exports (%)	Low-carbon imports (million US$)	Low-carbon imports share of total imports (%)	Total low-carbon trade as percent of GDP (%)
Afghanistan	0.02	0.00	105.47	1.56	0.56
Azerbaijan	16.14	0.07	679.77	5.81	1.27
China	229879.03	6.82	132804.61	4.96	2.04
Georgia	109.02	2.57	400.32	3.96	2.73
Kazakhstan	164.33	0.27	1849.62	4.40	1.02
Kyrgyz	14.84	0.89	153.03	2.75	1.81
Mongolia	6.39	0.07	361.55	5.27	2.41
Pakistan	68.18	0.24	3093.91	4.27	0.91
Tajikistan	0.54	0.04	164.70	3.91	1.85
Uzbekistan	28.43	0.20	1382.24	5.82	2.03

Table 11: Trade in low-carbon technology products across the CAREC countries

After analyzing data and carrying out econometric analyses this study came up with the following findings:

1. Government expenditure on pollution abatement, climate finance mechanisms like green bonds, and comprehensive environmental provisions in trade agreements positively influence low-carbon exports.
2. Environmental taxes do not have a significant impact.

3. ISO 14001 certification in exporting countries supports low-carbon product exports.

These findings provide actionable insights for fostering sustainable economic growth through climate-smart trade policies, benefiting both governments and businesses.

Finally, the following policy recommendations might prove to be useful for CAREC members:

1. Governments should prioritize and boost expenditures on pollution abatement under the COFOG framework, which will help reduce CO_2 emissions embedded in the economy and in trade.
2. The development and promotion of climate finance mechanisms like green bonds should be enhanced. These bonds mobilize capital for environmentally beneficial projects, aiding in the decarbonization of trade.
3. Existing trade agreements, such as ECOTA and CIS, should be amended to include comprehensive environmental provisions. New agreements should also integrate robust environmental measures to encourage sustainable practices and low-carbon trade.
4. Countries should promote and support compliance with international environmental standards like ISO1400 one certification. This will help manage environmental responsibilities effectively and contribute to climate mitigation and adaptation efforts.

Carbon pricing in Central Asia: opportunities and barriers: the case of the Kyrgyz Republic

***Speaker**: Aijan Sharshenova, Executive Director, Crossroads Central Asia, Kyrgyz Republic*

Introduction
This interdisciplinary study focused on the Kyrgyz Republic and was carried out by Crossroads Central Asia, a Bishkek-based think tank. The pillars of this project were carbon pricing, theory of change, and stakeholder mapping.

- Carbon pricing is a climate change mitigation mechanism and is new to the Central Asian region, but its impact has a positive track record worldwide. However, carbon pricing does need in-depth analysis before policymaking.
- The theory of change is an international development concept focused on how to bring about meaningful change and the idea of change vs. transformation.
- Stakeholder mapping is a management construct required for local ownership and allows analysis in state, non-state, and international dimensions.

Components
1. Climate change science
2. Climate mitigation mechanisms
3. Economics
4. International development studies
5. Public policy
6. Decision-making in politics
7. Political psychology
8. Strategic communication

Data collection and analysis

Desk research for this study included studying policy reports, academic publications, and statistical data as well as fieldwork. Fieldwork involved interviews with government officials, relevant civil society members, and experts. An online survey to collect data was also carried out.

Price of carbon

There is a wide range of prices when it comes to carbon internationally, ranging from USD 1 to USD 167. There are a mixture of carbon taxes and ETSs. The most effective tool in this regard is the World Bank's carbon pricing dashboard. The Kyrgyz Republic was more difficult to analyze as there is no historical price and it is an energy-intensive economy. Data was collected from the National Statistics Committee.

Figure 35 provides a breakdown of energy consumption by sector in Kyrgyzstan.

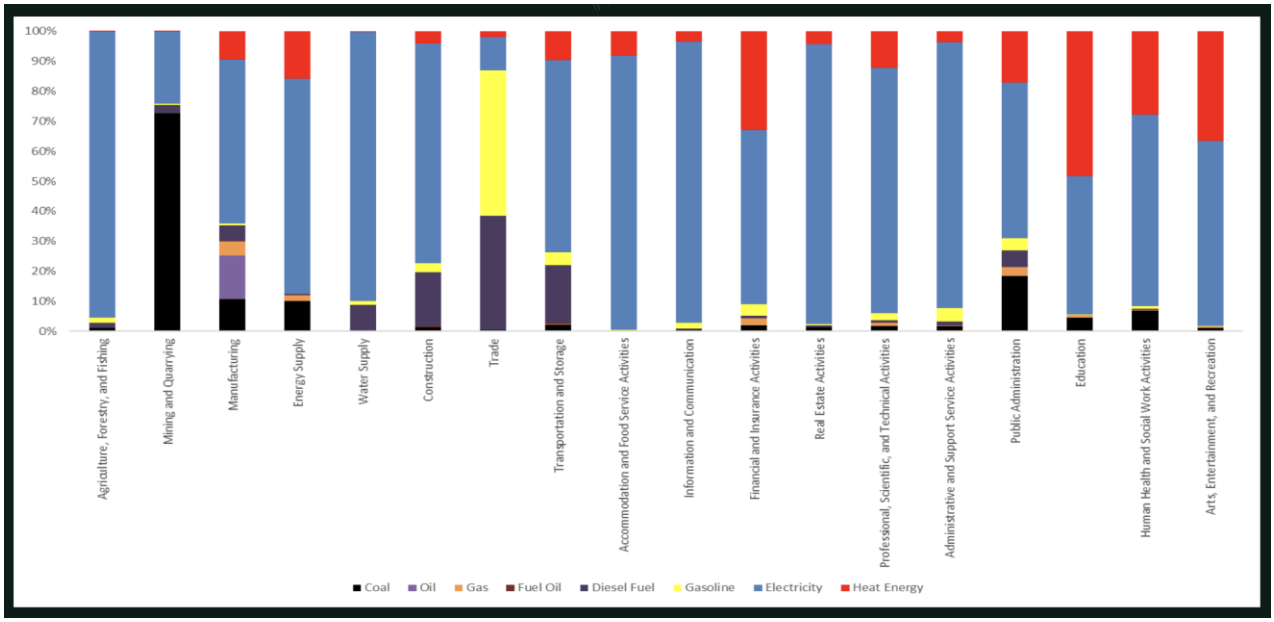


Figure 35: Energy consumption by sector and source in Kyrgyzstan

Figure 36 illustrates the amount of CO_2 emissions by sector in the Kyrgyz Republic.

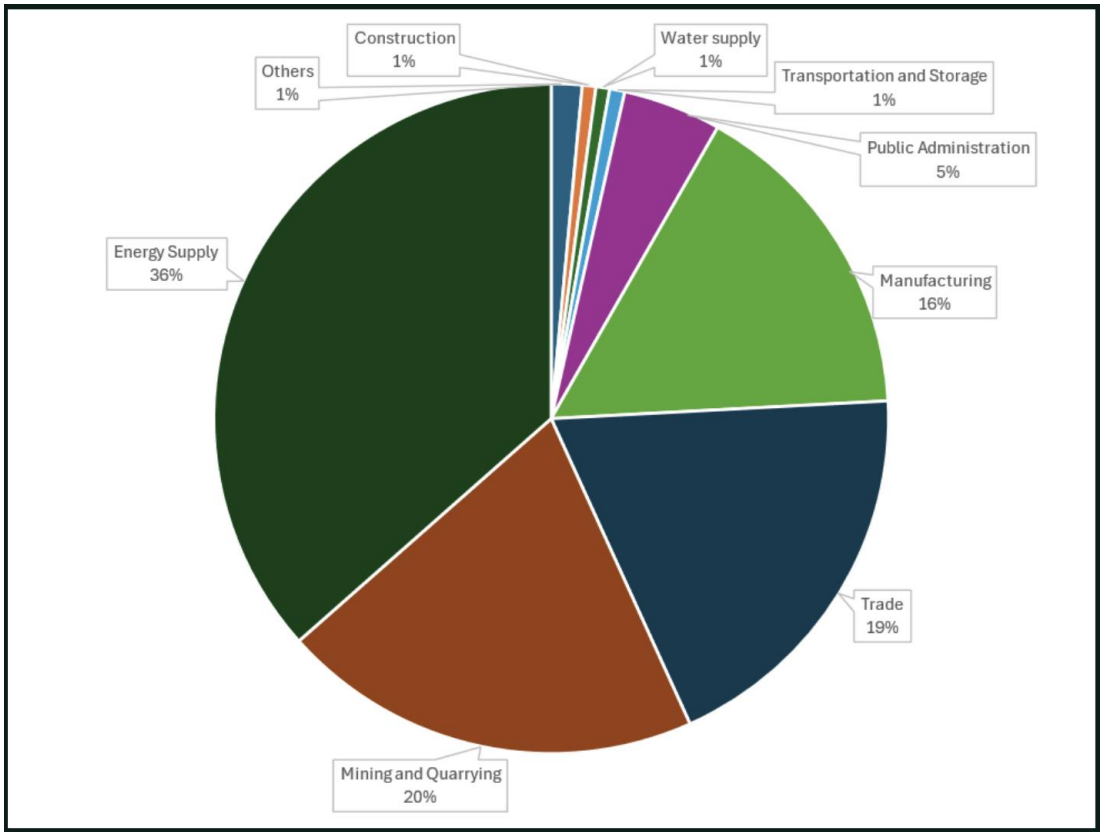


Figure 36: CO2 emissions breakdown by sector in Kyrgyzstan

If carbon taxes are to be introduced in the Kyrgyz Republic, a top-down approach is required and a normative and legal foundation will need to be built from scratch. Extensive and expensive expert support is required; therefore, external funding sources will be essential and a coalition/community of domestic and international stakeholders will need to be formed for which stakeholders need to be mapped.

It is also useful to map stakeholders because interested parties can be identified, their level of interest can be evaluated, their level of power/ability to impact can be evaluated, and engagement strategies can be tailored and developed.

Stakeholders can be broken down into the following categories:

Domestic

- Government stakeholders—president, cabinet of ministers, specific government agencies/units
- Private sector—businesses that will be taxed and businesses that can supply green tech
- Public stakeholders

International

- Donors—international organizations for expertise and international financial institutions (IFIs) for funding
- Investors—GHG quota buyers and green tech investors

Barriers in the Kyrgyz Republic

Current key barriers include a lack of normative and legal frameworks, a lack of domestic resources, a lack of expertise and data, and a business-only approach rather than one that takes into account economic, social, and environmental aspects.

Key opportunities
These include the flexibility of the Kyrgyz Republic, the resilience of Kyrgyz businesses, the availability of global investors, and the availability of committed experts at the mid-level management of the civil service.

Conclusions
Carbon pricing in the Kyrgyz Republic provides a strong incentive to reduce GHG and to adopt clean tech. It also generates revenue that the government can reinvest in sustainable development and enhances the Kyrgyz Republic's international standing to attract green investment.

A classical theory of change in the Kyrgyz Republic may not be applicable; a top-down approach is a must with long-term strategic commitments needed to work with businesses and the public.

Stakeholders in the case of the Kyrgyz Republic are as follows: government stakeholders are scattered across agencies; the private sector may be against carbon pricing and that needs to be changed. Public buy-in needs further exploration and a strong coalition of committed stakeholders is required.

SESSION V: INNOVATIVE TECHNOLOGIES FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

The rapid technological innovation offers a glimmer of hope for reversing or halting human-caused climate damage. However, technological innovation and the ensuing gains are not evenly distributed, amplifying vulnerabilities in developing economies. The first presentation in the session will discuss frameworks, mechanisms, and challenges for technological transfer. The second presentation will focus on the development and deployment of scalable technologies for climate mitigation and adaptation, particularly in renewable energy, infrastructure, agriculture, and urban planning sectors. Developing a regional ecosystem is critical for surmounting climate challenges. This topic will be covered by the third speaker. The third presentation will discuss the scope, opportunities, and challenges of fostering regional cooperation for developing a technology ecosystem. The speakers will deliver presentations (15 minutes each) on session topics, followed by a moderated discussion (25 minutes), capturing comments and feedback and inviting questions from the participants.

***Moderator**: Hans Holzhacker, Chief Economist, CAREC Institute*

Technological disparity: bridging the gap between advanced and developing economies

***Speaker**: Dr Xianchun Tan, Professor of the Institutes of Science and Development, Vice-Director of the Center for Carbon Neutrality Strategy, Chinese Academy of Sciences (CASISD)*

This presentation was broken down into the following three parts:

1. A global move towards carbon neutrality: objectives, strategies, and technological innovations
2. The carbon neutralization policy framework and technological innovation in developing countries taking China as an example
3. Thoughts on low-carbon technology cooperation between different regions around the world

Paris Agreement and IPCC sixth assessment report
Long-term goals of the Paris Agreement (2015): 2℃/strive for 1.5℃, reach peak and reduce emissions as soon as possible, and balance carbon sources and sinks in the second half of this century.

Historical emission trends in IPCC AR6 (2023): global GHG emissions continue to rise, and historical cumulative carbon emissions from 1850 to 2019 are close to the 1.5°C and 2°C target emission budgets, accounting for 4/5 of the 1.5°C scenario carbon budget and 2/3 of the 2°C carbon budget.

Tackling climate change in IPCC AR6 (2023): rapid and deep transformation of all sectors and systems around the world is critical, and the systemic change required is unprecedented in scale.

Distribution of climate extremes worldwide
There were a total of 652 extreme climate events worldwide from 2000 to 2022; these can be broken down into the following types:

- 209 extreme floods
- 178 tropical cyclones
- 141 convective storms

- 66 extreme droughts
- 34 high-temperature periods
- 16 low-temperature periods
- 8 other types of storm

In the Americas and in Asia, the frequency of extreme climate events is relatively high, with 255 and 238 occurrences respectively, accounting for 39 percent and 36 percent of the total number of global climate events. Europe has the second highest frequency of climate events after Asia, accounting for 15 percent of the total. Africa and Oceania account for 4.9 percent and 4.6 percent respectively.

Carbon neutrality as a global trend in addressing climate change
So far, more than 150 countries have committed themselves to achieving carbon neutrality goals, with over 90 percent setting a goal of achieving carbon neutrality by 2050. These countries committed to carbon neutrality contribute to 88 percent of global carbon emissions, 92 percent of the world's GDP, and 89 percent of the world's population.

Key measures for carbon neutrality in major countries
In the energy sector, building a highly reliable power grid with renewable energy generation as the mainstay has become a basic consensus. In terms of coal phaseout, most European countries have reached a consensus on coal withdrawal, and countries with high dependence on coal have placed greater emphasis on improving the operational efficiency of coal-fired power units. There is also a back-and-forth on the development of nuclear, oil, and gas resources.

In the industrial sector, it is important to develop a circular economy and improve energy efficiency. Furthermore, the development of technologies—such as electrical and hydrogen energy—to replace fossil fuels is crucial. The promotion of decarbonization processes as well as carbon capture and storage should be prioritized by the government.

In the building sector, increasing the promotion of green building materials and green construction practices along with promoting electrification substitution and distributed energy supply are a priority. The challenge of energy conservation and emissions reduction in the building sector lies in the retrofitting of existing buildings and heating systems, as well as the development of universally applicable technologies for ultra-low energy buildings.

In the transportation sector, it is important to promote the large-scale adoption of relatively mature new energy vehicles and build and improve charging infrastructure. In fields like aviation and maritime that are still maturing, priority needs to be given to the adjustment and optimization of travel structures and continued research in the development of zero carbon fuel technology.

Technological innovation for carbon neutrality in major countries
In terms of technology transfer strategy, major countries are pursuing 'technological leadership' and 'industrial competition,' but the focus of science and technology strategy is different. In terms of scientific and technological innovation layout, most of the major economies have developed top-level designs and a roadmap for carbon neutralization of scientific and technological innovation. In the field of key technology, various economies focus on hydrogen energy, renewable energy, and CCU among others, but there are certain differences. After putting forward the goal of carbon neutrality, countries around the world have formulated scientific and technological strategies for carbon neutrality, accelerated the layout of green and low-carbon technology innovation and industrial competition, and tried to gain an advantage in future international competition.

Technological innovation policies for carbon neutrality in major countries
The world's major countries have formulated a systematic policy system to promote carbon neutrality. Technological innovation is the focus of carbon neutrality policies in various countries. The United States and Japan both focus on the policy design of green low-carbon technology

innovation. Table 12 shows green growth-related technology strategies and top-level designs in the United States, Japan, and the European Union.

Coun	Technology strategy	Top -level design	Key technical field
USA	Cost advantage+local manufacturing	"Transforming Clean Energy Solution"	Hydrogen energy, next -generation building materials, battery energy storage, CCUS, renewable energy, advanced nuclear energy
Japan	Technical advantage+internatio nal cooperation	"Green Growth Strategy"	Sea wind power, ammonia fuel, hydrogen energy, nuclear energy, next -generation residential, commercial buildings and solar energy, automobiles and batteries, ships, carbon circulation industries.
EU	Product leader+local manufacturing+influe nce global rules	"European Green Agreement" coordinates the EU "Innovation Fund" and "Horizon Europe"	Renewable energy power generation technology, power grid infrastructure and transmission technology, energy technology, high -energy building key technology, ultra -fast charging infrastructure, lithium ion or new chemical battery technology, low -carbon product design, CCUS

Table 12: Low-carbon technology priorities across the United States, Japan, and the European Union

Japan's green growth strategy

Objective: half of the power composition is renewable energy, 10 percent hydrogen and ammonia, and the remaining 30 percent to 40 percent is a coal-fired power station with nuclear energy and carbon capture technology. Technical innovation focus: sea wind power, fuel, ammonia and hydrogen energy, and new generation of solar energy. Industry support policy systems are also in place for building a technological innovation value chain.

Funding measures proposed by Japan's green growth strategy

- Adopt a diversified funding method to support the development of related technologies.
- Establish a green innovation fund, invest CNY 2 trillion in ten years, and stimulate private R&D and investment worth CNY 1.5 trillion. Tax incentives will stimulate private investment worth CNY 1.7 trillion in ten years. Financing forms transition financing guidelines and establish long-term fund plans with interest subsidies to attract global ESG investment.
- Strengthen the organizational mechanism of coordination of carbon neutralization and technology innovation action.
- Carbon neutralization policy framework and technological innovation in developing countries: taking China as an example.

In the United States, in February 2021, the Climate Innovation Working Group, hosted by the White House Domestic Climate Policy Office, the Science and Technology Policy Office, and the Office of Management and Budget (OMB), made recommendations to strengthen the New Labor Party within the scope of the federal government. Their aim was to cultivate technologies that could transform the rules of the game. They focused on technical areas such as net zero carbon buildings, energy storage, sustainable fuels, green hydrogen, soil innovation management, and more.

China's initiative to achieve the goals of carbon peaking and carbon neutrality

Internationally

On 22 September 2020, President Xi Jinping announced at the General Debate of the 75th Session of the United Nations General Assembly that 'China aims to peak CO_2 emissions before 2030 and achieve carbon neutrality by 2060.' At the Climate Ambition Summit, President Xi further announced the commitment that by 2030 China will lower its CO_2 emissions per unit of GDP by more than 65

percent from the 2005 level and increase the share of non-fossil fuels in primary energy consumption to around 25 percent.

Domestically
It is further stated in the Report of the 20th National Congress of the Communist Party of China (CPC) that China will actively and steadily advance carbon peaking and carbon neutrality. This major announcement marked the beginning of China's journey to reach carbon peak and carbon neutrality, effectively promoting the global response to climate change.

With the introduction of the '1+N' policy system for carbon peaking and carbon neutrality, the 'dual carbon' work has entered the stage of practical implementation.

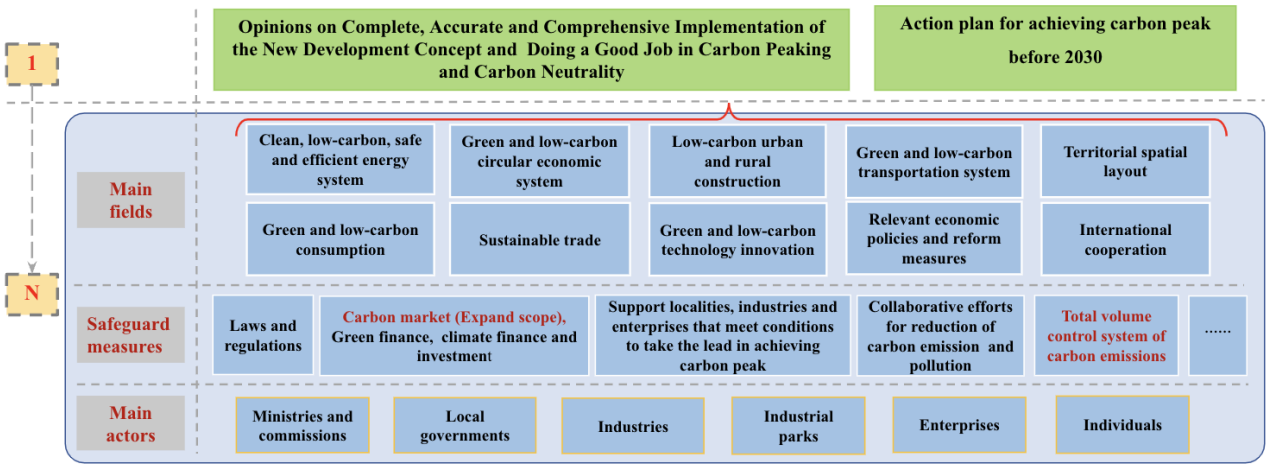


Figure 37: China's transformation of the development model towards carbon neutrality goals

The dual carbon goal will promote systematic changes in China's economy and society, from the expansion of extension scale expansion based on resource consumption to the connotative development path of technological innovation as the driving force.

In recent years, China's energy consumption structure has continued to optimize, but the proportion of fossil energy is still high. To achieve China's double carbon goal, it is necessary to rely on technological development to improve energy efficiency and transform the clean utilization of fossil fuel energy such as coal.

To solve the problem of energy structure, it is necessary to strengthen the breakthrough of disruptive and critical technology and to promote the cross-fusion of multidisciplinary technology such as new energy, new materials, and advanced energy-saving technologies. Carbon peaks and carbon neutralization must be promoted with technology; innovation policies need to pay more attention to systemic change and transformation for sustainable development.

Year	Energy consumption (10^8t oil equivalent)	%			
		petroleum	natural gas	coal	Non-fossil energy
2010年	25.25	17.40	4.00	69.20	9.40
2011年	27.09	16.80	4.60	70.20	8.40
2012年	28.15	17.00	4.80	68.50	9.70
2013年	29.18	17.10	5.30	67.40	10.20
2014年	29.81	17.40	5.70	65.60	11.30
2015年	30.09	18.30	5.90	63.70	12.10
2016年	30.51	18.50	6.20	62.00	13.30
2017年	31.40	18.80	7.00	60.40	13.80
2018年	32.48	18.90	7.80	59.00	14.30
2019年	34.02	19.00	8.30	57.90	14.90

Table 13: Trends in China's energy consumption by source, 2010-2019

Year	Policies and actions
2012	Provide **CNY 200 million** for **a three-year** international cooperation initiative to assist small island states, least-developed countries, African countries in addressing climate change.
2014	Provide **USD 6 million** in funding to support the United Nations Secretary General in promoting south–south cooperation to address climate change.
2015	Establish a **CNY 20 billion** China south–south climate cooperation fund, and announce the launch of the 'Hundred, Thousand, and Ten Thousand Project' for South–South climate cooperation in developing countries in 2016. This initiative includes setting up **ten low-carbon demonstration zones**, implementing **100 climate change mitigation and adaptation projects**, and **providing 1,000 training opportunities** to address climate change, thereby continuously advancing international cooperation in areas such as clean energy for disaster prevention and mitigation, and ecological protection.
2018	Implement **50 green development and ecological environmental protection projects** in Africa, with a focus on strengthening exchanges and cooperation in areas such as climate change response and marine cooperation.
2021	Implement **ten green environmental protection and climate change projects** in Africa, and establish low-carbon demonstration zones and climate change adaptation demonstration zones in Africa. Issue the 'China–Africa Climate Change Cooperation Declaration,' launch a three-year action plan for China–Africa climate change response, and establish the China–Pacific Island Countries South–South Cooperation Center for Climate Change Response.

Table 14: China's policies and actions on south–south climate cooperation, 2012-2021

Deficit	Challenge
(1)Emission reduction deficit	If countries only implement the current NDC, global temperature rise in the 21st century will exceed 2°C. If some countries fail to honor their commitments and ensure that the NDC is fully realized on time, the gap between the 1.5°C temperature rise target and the target will be even greater.
(2)Adaptation deficit	Lack of scientific indicator system and financing for the effectiveness of adaptation actions. Lack of globally recognized path to achieve adaptation goals.
(3)Funding deficit	After the epidemic and new geopolitical impacts, the global economy is weak, squeezing the fiscal space for action on climate change. The scale of investment by developed countries is far lower than the demand and the number of commitments; new funding needs such as adaptation, loss and damage. Comprehensive capacity building and multi-facete development gaps, uncertainty about the impact of new laws and regulations such as European and American CABM.
(4)Technology deficit	At present, new technologies such as DAC and BECCS do not have the conditions for large-scale use and are difficult to implement.
(5)Leadership deficit	The lack of a fair, resilient, and sustainable good gvernance system weakens climate governance; the capacity deficit is also prominent.

Table 15: Key deficits and challenges in global climate action

Thoughts on low-carbon technology cooperation between different regions around the world

Huge gaps remain in achieving global carbon neutrality—global climate governance level
Global climate governance has shifted from a single focus on GHG emission reduction to multiple levels of mitigation, adaptation, funding, technology, and capacity building. It requires strengthening the coordination of mitigation and adaptation as well as requiring systematic design, promotion, and transformation. Achieving carbon neutrality globally still requires huge efforts.

Huge gaps remain in achieving global carbon neutrality—technical level
The R&D of developed countries—such as the United States—are leading the field of green technology; they are the main sources of green PCT patent technology (PCT patent application volume represents the development level of green technology). As a representative of developing countries—although the number of Chinese green technology PCT patent applications is increasing—there is still a certain gap with the leading countries.

Since 2000, the development of green technology has gone through three stages: rapid growth, slow decline, and gradual rise. China's green technology PCT patent application volume has increased rapidly since 2015, but there is still a large gap with developed countries such as the United States, Japan, and Germany. The layout of green technology in various countries is in the fields of energy consumption, environmental management, construction, and production products and processing. The number of PCT patterns in each green technology category is much lower than in the United States, Japan, and Germany.

COP28 and the new global initiates for climate change

The United Arab Emirates consensus
Global progress in tackling climate change: the world is currently not on track to reduce emissions to the necessary levels to limit the temperature rise to 1.5°C. By 2030, global GHG emissions need to be reduced by 43 percent compared to 2019 to keep global warming within 1.5°C.

About energy transition goals and initiatives: parties have committed to doubling the global renewable energy capacity by 2030 and to doubling the annual global energy efficiency.

About global adaptation goals and supporting actions: parties are strengthening adaptation planning and implementation based on national adaptation plans, adaptation communication, and nationally determined contributions.

To date, 51 parties have submitted national adaptation plans, and 62 parties have submitted adaptation communications.

Supporting the goals and actions of developing countries: it is projected that by 2030, the adaptation funding needs for developing countries are estimated to be between USD 215 billion to USD 387 billion annually. By the end of 2030, approximately USD 4.3 trillion will need to be invested annually in clean energy. This investment will then need to increase to USD 5 trillion per year by the end of 2050 to achieve net zero emissions by 2050.

Principles and content of low-carbon technology cooperation between different regions around the world: the basic principles of international cooperation on low-carbon technology are as follows:

- Common but differentiated principle
- Sustainable development principles
- The principle of equity

Different regions around the world should actively participate in global environmental climate governance and international technology cooperation to do the following:

- Exchange, learn, and share green and low-carbon technologies and technological innovation policies
- Actively promote international cooperation, build consensus on sustainable development, and jointly promote clean energy transition

Scalable solutions I: greening economic corridors, production, and trade

***Speaker**: Mr Kumar Utsav, Country Director, ADB Kazakhstan Resident Mission*

The outline of this presentation was as follows:

Economic corridor development (ECD): what and how?
Developing economic corridors: an example
Greening economic corridors:

- Corridor development framework
- Logistics
- Industrial zones
- SMEs

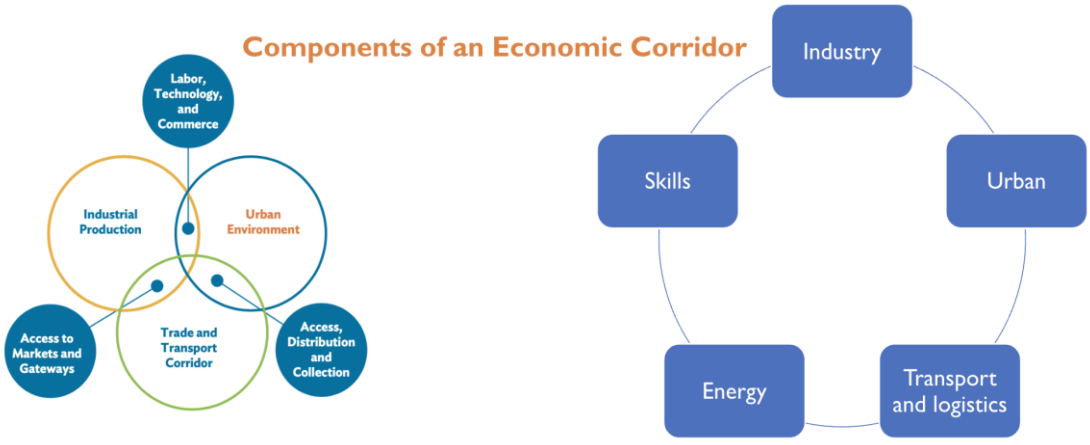


Figure 38: Key components of an economic corridor

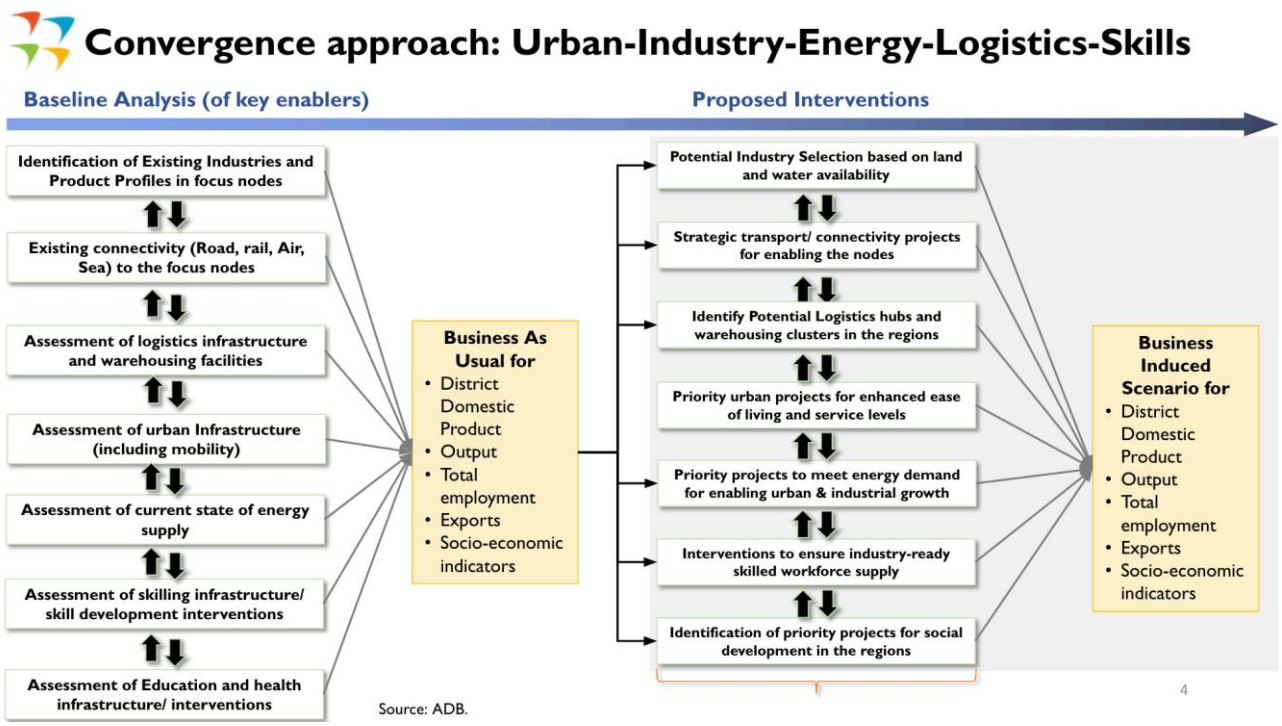


Figure 39: Analytical framework for corridor development

Institutional and policy framework is essential for economic corridor development. Key institutional and regulatory interventions that are needed include the following:

1. Policies governing institutional structures for corridor development
2. Easing the process of setting up and closing a business
3. Streamlining regulations to improve the business environment
4. Ports, shipping, and trade facilitation

360 degree approach: industrial development, logistics development, trade facilitation, and skilling

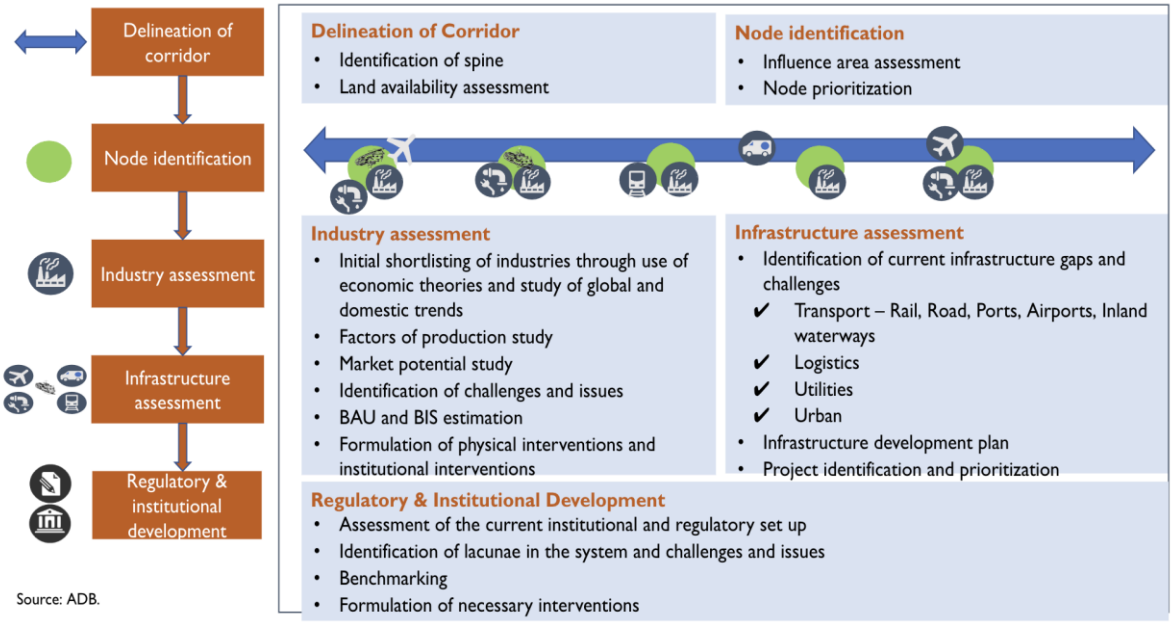


Figure 40: Framework for corridor development: key stages and assessments

Economic corridor and industrial cluster development

- Planning, project financing, and policy reforms
- industrial–urban–logistics–skills–energy convergence
- Investment promotion
- MSME clusters
- Industrial park rating system (IPRS)
- Green industrial parks
- Green corridor framework

Logistics and trade facilitation

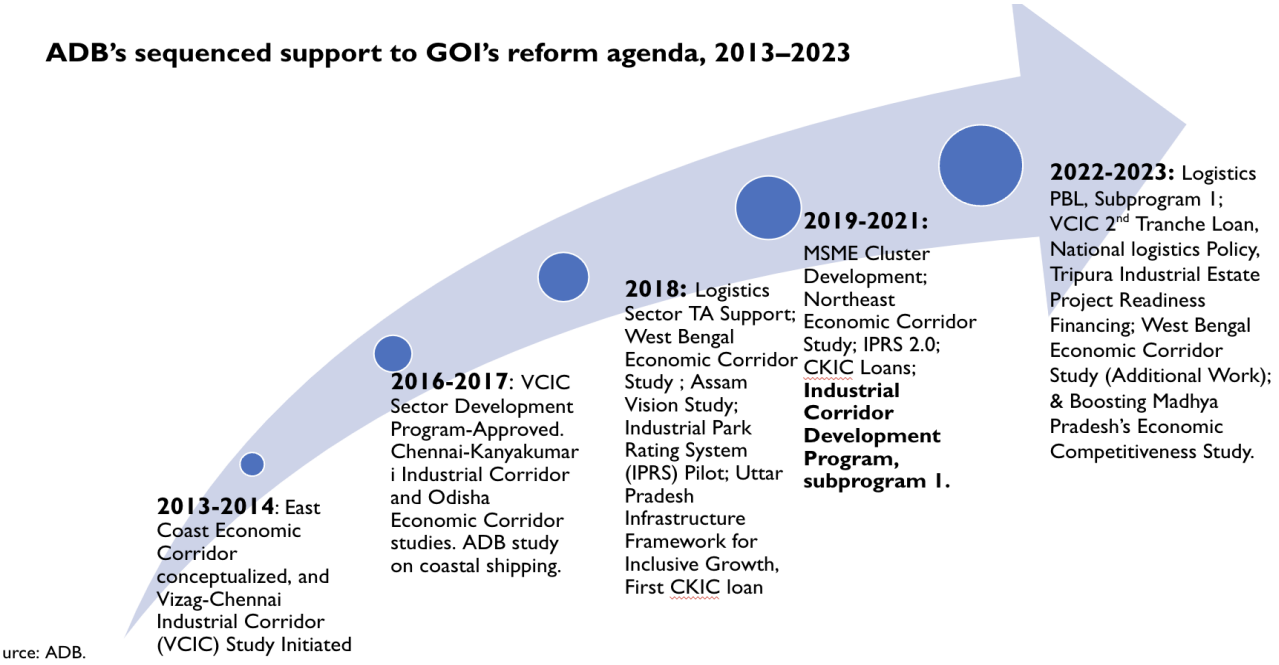
- Support for implementation of PM GATI SHAKTI and national logistics policy
- Export and import and domestic policy reforms
- Shift to greener modes of transport (railways, inland waterway transport (IWT), and coastal shipping)
- Infrastructure gap assessment for achieving USD 1 trillion in exports by 2030

Skills ecosystem

- Global skills parks (MP, Odisha)
- ITI development (many states)
- Skills university (Assam and Gujarat)
- Study on skills for port workers' ecosystem

The 360 degree approach is all-encompassing with hard infrastructure development. Softer aspects of this approach include policy reforms, process streamlining, and nudge economics (ratings). This approach enables a move from national to regional corridor development and logistics sector enhancement, capacity development, and institutional strengthening of existing institutions/framework for new institutions.

The ADB's engagement in India in economic corridor development has followed an integrated and holistic approach (see Figure 40).



urce: ADB.

Figure 41: Timeline of ADB's support to India's economic corridor development, 2013-2023

Economic corridor development presents several entry points for incorporating green and climate elements:

- Corridor development framework
- Logistics
- Industrial zones
- SMEs
- Skills
- Energy
- Urban development

Greening economic corridor development

- Rationale: to ensure environmental sustainability, an appropriate mechanism needs to be in place to plan and implement green measures through various entities involved in the project development throughout the phases of the project in an effective and systematic manner
- Objective: projects will be implemented based on certain fundamental considerations of sustainable development

Objectives of the green industrial corridor development policy framework

1. Avoidance of natural habits
2. Reduction of environmental impacts through discharge/emission
3. Green and sustainable procurement
4. Reduction of climate change impacts
5. Reduce, recycle, and reuse (circular economy)
6. Improve resource efficiency (energy, water, material)
7. Green transport network
8. Sustainable finance and responsible investment

Globally, the volatile trade scenarios and focus on decarbonization have pushed stakeholders to think beyond logistics efficiency. While logistics costs remain an inherent focus in GVCs, resilience and sustainability have emerged as new global requirements.

- Influencing overall trade costs
- Determining comparative advantage
- Influencing domestic price of all inputs
- Allowing better exploitation of cross-country cost differences
- Frequent supply-chain disruptions (war/pandemic/disaster)
- International pressure to address GHG emissions (reduce carbon intensity)
- Supply chain dependencies and vulnerabilities

Incorporating green and resilient thinking across these seven key areas can help create a sustainable logistics ecosystem.

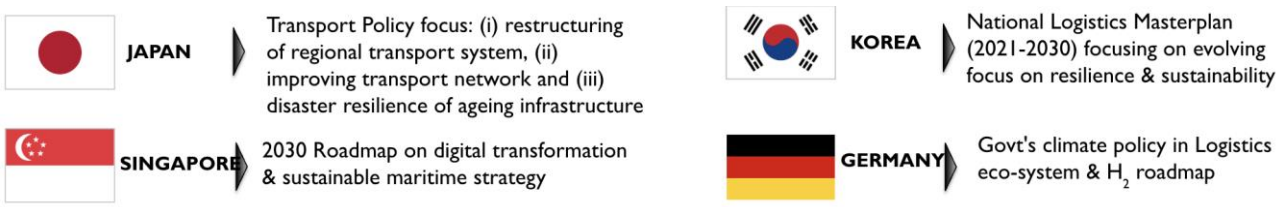


Figure 42: Logistics and industrial sustainability policies across selected nations

Industrial economic zones can play a catalytic role in economic development:

- Attracting big ticket investments in manufacturing.
- Promoting balanced development by providing impetus to the economy in rural and semi-urban areas.

- Supporting SMEs in their overall growth by offering world-class common infrastructure and a conducive business environment in which to thrive. Provide a one-stop shop for sector-specific companies to establish their manufacturing facilities and benefit from shared infrastructure and economies of scale.
- Key role in creating employment opportunities to ensure the population of working age gains employment in more productive jobs.
- Global competitiveness and linkage to GVCs. Industrial zones help companies benefit from economies of scale and manufacture at lower costs, thus helping companies gain an edge over competitors in other countries as well as being more amenable to regional and GVCs.
- Availability of world-class industrial, environmental, and social infrastructure to attract FDI—including in new sectors—and contribute to a country's green growth agenda.

Green industrial zones

- Developing sufficient and appropriate regulations for the adoption of environmental and social standards, and their enforcement.
- Need to incentivize industrial parks and firms to prioritize sustainability.
- Expensive technologies, cost of R&D, and high upfront capital costs with longer-term returns.
- Limited financial support for innovative processes and environmental measures.
- Need to build technical capacity.

Promoting green SMEs

- Simplifying environmental regulatory requirements for SMEs
- Providing information, advice, and guidance
- Recognizing green practices
- Creating financial incentives
- Supporting access to green finance
- Sending the right market signals
- Building institutional partnerships

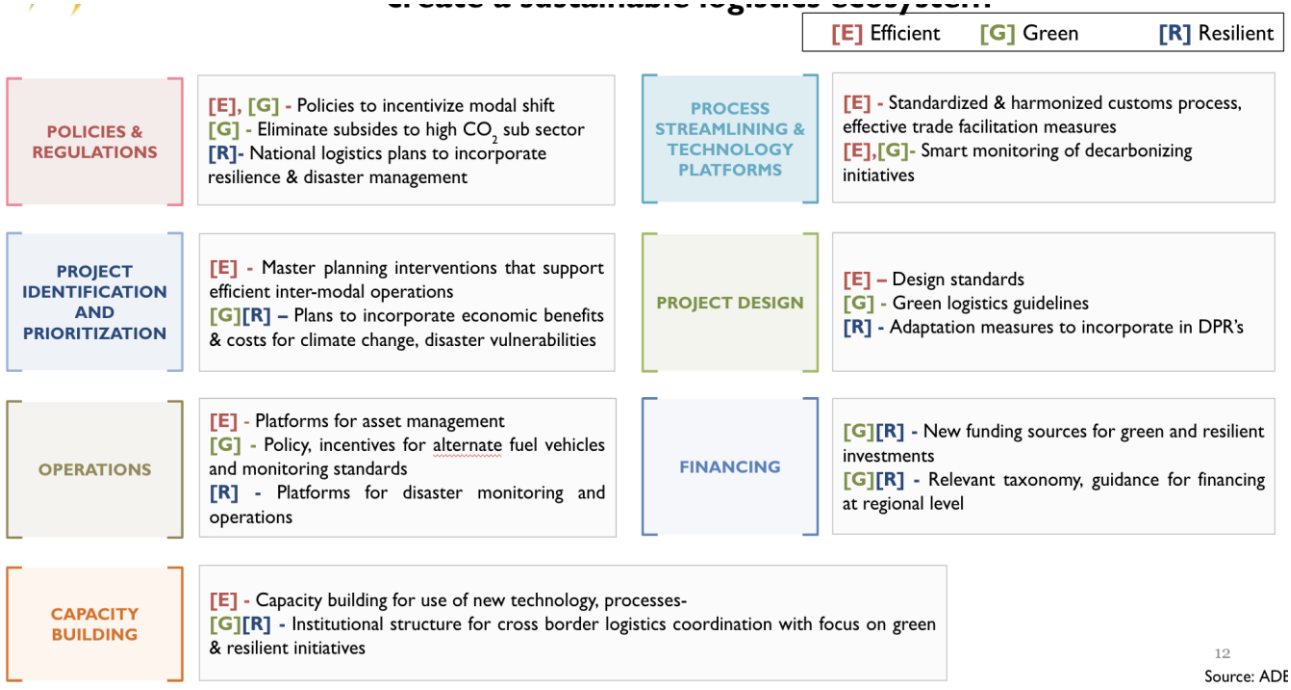


Figure 43: ADB's key strategies for building resilient logistics

Scalable solutions II: green hydrogen: opportunities, challenges, and policy

***Speaker**: Ms Dina Azhgaliyeva, ADBI*

Green hydrogen is anticipated to be a 'game changer' in energy production and consumption; it is also expected to make significant contributions towards the net zero emission pathway. Green hydrogen also provides opportunities for Central Asia and the CAREC region when it comes to the green transition, climate resiliency, and reducing carbon emissions:

1. Decarbonizing hard-to-abate industries (where renewable energy is not a substitute) such as, steel, cement, and petrochemicals
2. Energy storage: seasonal/long term; excess of renewable energy
3. Transport
4. Source of revenue from exports

Issues with hydrogen:

1. Safety—this can be a concern with hydrogen if it is used on an unprecedented scale and for new applications.
2. Not necessarily low carbon.
3. Cost—the demand for H_2 energy is yet to be seen. It is also expensive, but the cost is falling; however, it is still better to use renewable energy where possible. The production of green hydrogen must be at scale if the cost is to be driven down, but again the demand is not known.
4. Infrastructure—green hydrogen has a low volumetric energy density (energy per volume). The production, transportation (short and long distance), and utilization of green hydrogen all require infrastructure (better to use existing infrastructure where possible).
5. Water scarcity is also a problem in Central Asia; large quantities are required for the production of green hydrogen.

There are several countries with national hydrogen strategies in Asia–Pacific: Australia, the People's Republic of China, India, Japan, Singapore, the Republic of Korea, and Kazakhstan. Countries and regions with forthcoming strategies include Southeast Asia, Mongolia, Nepal, and New Zealand.

Kazakhstan has a concept of hydrogen development as part of its Kazakhstan 2040 strategy, the principles of which include sustainability, innovation, renewable energy, infrastructure, international cooperation, standardization and regulation, and education and information. Targets that are a part of this strategy include and focus on green hydrogen; these include 10 GW of electrolyzed capacity by 2040, attracting KZT 5 trillion in investment by 2040, pushing up the share of local technology to 20 percent and pilot production beginning in 2030.

More than 35 percent of the global green and blue hydrogen production capacity (in operation and planned) is in highly water-stressed regions (Northern China, GCC, Europe). Water is required as an input for production as well as a cooling medium for all types of hydrogen production. Green hydrogen is the most water-efficient of all clean hydrogen types, which is why green hydrogen projects should be prioritized for future hydrogen development. Hydrogen production should also be incentivized to use water-efficient cooling technologies such as air cooling. Kazakhstan and Uzbekistan can lead the energy transition in this region owing to their decarbonization ambitions and resources.

In the PRC, hydrogen trucks have been included in the country's hydrogen energy industry development plan. Trucks constitute 11 percent of total road vehicle ownership but account for 46 percent of total transportation emissions. In contrast, passenger vehicles make up 87 percent of ownership but 44 percent of emissions. Trucks have significantly higher emissions per vehicle than passenger cars.

There is also policy support in the PRC in the green hydrogen industry and for hydrogen trucks. The PRC offers purchase subsidies covering about 50 percent of the hydrogen truck's selling price. In

contrast, for electric trucks the subsidy is only 13 percent of the selling price. The subsidy policy is effective as the total cost of ownership (TCO) depends heavily on hydrogen prices and a lack of infrastructure leads to excessive additional costs (travel disutility cost).

Hydrogen trucks are more expensive than any other trucks; hydrogen itself is very expensive, and hydrogen stations are few and far between. It is much more expensive than diesel transportation or electrified trucks. Hydrogen trucks should become price-competitive by 2030.

Developing innovation ecosystem: impact of the Made in China 2025 industrial strategy on green innovation

***Speaker**: Dr Asif Razzaq, Senior Researcher, CAREC Institute*

Introduction

Industrial policy is usually defined as addressing structural changes of the economy to support sustained rapid industrialization. China's industrial development is not only a result of market-oriented reform and a more open domestic market, but also to the correct industrial development strategy and evolving industrial policies. China has been through four stages of industrial reform:

1. System transition period (1978-1991)
2. The initial establishment of the market economy system (1992-2001)
3. China's accession to the WTO to the 18th National Congress of the Chinese Communist Party (2001-2012)
4. The period since the 18th National Congress (2012-2019)

The Made in China 2025 policy was implemented in 2015 and has two main objectives: obtaining a leading position in manufacturing and transitioning from the world's factory to a technological powerhouse. The objective of obtaining a leading position in manufacturing was mainly implemented through local government in certain pilot cities, with ten core industries identified—railway equipment, new energy vehicles, new information technology, electrical equipment, new materials, numerical control machinery and robots, biopharmaceuticals and medical devices, aerospace and aviation equipment, agricultural machinery and equipment, and maritime engineering equipment and high-tech vessels—and the goal of self-sufficiency in 70 percent of materials by 2025. The second objective of transitioning from the world's factory to a tech powerhouse included the establishment of a high-tech industry, smart manufacturing, and independence from foreign suppliers.

MIC 2025 in 2015 is a highly institutionalized techno-industrial policy, which targets key technologies and sectors in the next ten years. The new policy is consistent with the goal of 'indigenous innovation.' The 13th (2016-2020) and 14th (2021-2025) five-year plans both include innovation-driven growth, low-carbon development, and a reduction in carbon intensity. Green industrial transformation and energy transition are also two fundamental objectives of both the 13th and 14th five-year plans.

China's total expenditure on research and development (R&D) amounted to nearly CNY 3.09 trillion (about USD 456 billion, 2.55 percent of GDP) in 2022, up 10.4 percent year on year according to the National Bureau of Statistics.

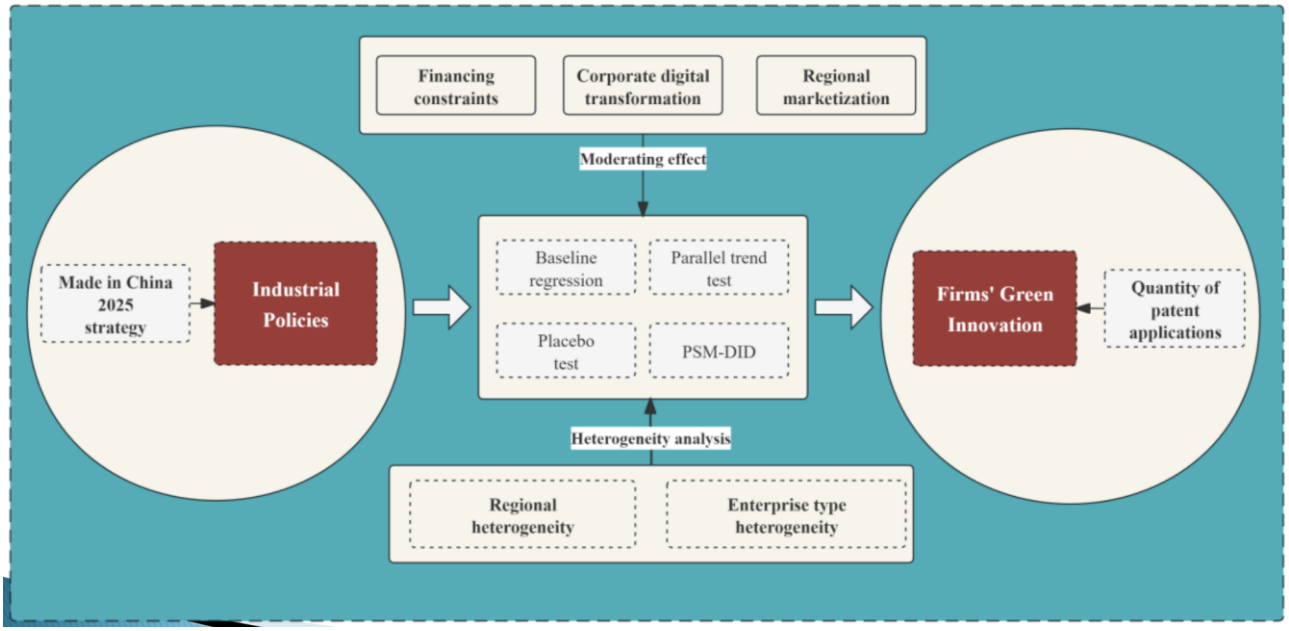


Figure 44: MIC 2025 strategy overview

Objectives

The objectives of this study were to assess the impact of the MIC strategy on the green innovation of firms using a natural quasi-experiment; to examine regional/industrial disparities in the influence of industrial policies on green innovation; to analyze the role of financing constraints, digital transformation, and marketization in moderating the effects of MIC on green innovation; and to analyze the other factors of corporate green innovation and lessons for peer countries.

The analytical framework can be seen in Figure 44. Companies in the financial category were excluded along with companies missing main variables. 1,594 firms were selected for the study, with 815 treated and 779 in the control group. Observations ranged from 8,850 to 10,538.

Results and explanations

The Made in China policy contributes to corporate green innovation; however, its marginal impact varies at the industrial level, regional disparity, and the nature of firms. The policy influences the green innovation of the firms by removing financing constraints, digital transformation, and increasing regional marketization. After the policy intervention in 2015, those firms that fell under the Made in China strategy—as opposed to those not included—showed some significant positive results. The result of 1.168 implied that those firms falling under the category had more green patents filed by 1.168 percent. Those control groups have a significantly higher score. Counterfactual testing shows that it was insignificant. The study found that the 2015 strategy significantly influenced the green performance of firms in those sectors. Furthermore, lightly polluting industries showed positive impacts in the control group as opposed to those outside it. More pronounced is the impact on those industries that are lightly polluting. However, in heavily polluting industries, this effect is negligible.

Prior literature produced mixed outcomes, these studies mainly examined the Made in China policy's impact on a firm’s performance, productivity, overall R&D input intensity, and financing availability. However, no conclusive outcome has been drawn for various reasons. So far, no noticeable study has explored the impact of the Made in China policy on green innovation through a unique mechanism.

Future considerations

This working paper will be extended to consider foreign spillovers, especially inward FDI spillovers considering specific firms and industries, rather than taking all sectors into account. Furthermore, a single firm/industry-level case study could be explored to navigate the direct benefits received from the Made in China 2025 strategy. A comparative analysis of different industrial initiatives could also be considered.

Recommendations

1. Enhance industrial policy quality: shift focus from scale and quantity to improving the industry quality and productivity. Increase support for advanced manufacturing and enhance resource allocation efficiency to boost green innovation levels.
2. Establish a green innovation system: develop a comprehensive innovation framework that promotes green innovation. Support enterprises with financial assistance, innovation incentives, and tax benefits to enhance their green competitiveness and sustain industry growth.
3. Tailor regional policies: create region-specific industrial policies considering regional disparities and pollution levels. Offer greater support and incentives to enterprises in the eastern regions and those with lower pollution to accelerate their green innovation efforts.
4. Reduce financing constraints: establish a green finance fund and implement green credit policies to ease financing for green innovation. Encourage digital transformation in enterprises by providing support and training; strengthen market competition mechanisms to ensure fair practices.


изводства и торговли
Greening Economic Corridors
Almaty
27 August 2024
Utsav Kumar
Kazakhstan Resident Mission

SESSION VI: LOCAL SOLUTIONS FOR CLIMATE RESILIENCE

Active involvement of subnational governments, local communities, and NGOs is paramount in crafting effective policy responses to address the existential threat of climate change. Emphasizing localized solutions that leverage innovative technologies sets a precedent worth replicating and scaling up. During this session, member think tanks of the CTTN will showcase country-specific examples of small yet intelligent solutions aiding communities in their climate change adaptation endeavors. This south–south learning session aims to foster increased regional cooperation in discovering sustainable solutions. In this session, six country cases (10 minutes each) will be presented. The moderator will lead and facilitate the discussion (30 minutes) by inviting participant comments, feedback, and questions.

***Moderator**: Jang Ping Thia, Lead Economist and Manager of the Economics Department, AIIB*

Azerbaijan case study

***Presenter**: Vusala Jafarova, Head of Turkic World Research Center, Center for Analysis of Economic Reforms and Communication (CAERC), Azerbaijan*

Introduction

Azerbaijan has innovative approaches to climate change adaptation using localized solutions, leveraging technology and community involvement. With a population of around 10 million, the share of the Republic of Azerbaijan in global warming historically has been negligible. Azerbaijan contributes only 0.15 percent of total global GHG emissions. In 2016, the amount of GHG was estimated at MNT 61.257 of CO_2 equivalent, and net emissions—taking into account the removals—were estimated at MNT 54.033 of CO_2 equivalent.

However, the physical and geographical characteristics of Azerbaijan make it a highly sensitive country to the effects of climate change, which has been witnessed in the increase in the number of droughts, thermal stresses, floods, and other dangerous natural phenomena. Per capita emissions in Azerbaijan amounted to 6.3 tons of CO_2 equivalent, and net emissions—taking into account the removals—amounted to 5.6 tons of CO_2 equivalent. For comparison, in 2016, the world average per capita emissions (absorption) was 6 tons of CO_2 equivalent, but in developed countries—such as Germany and Austria—these figures were 9.79 tons and 7.74 tons of CO_2 equivalent, respectively. According to the GHG inventory for 1990 to 2016, in 2016 Azerbaijan achieved a 31.6 percent reduction in emissions compared to the base year (1990).

The average temperature in the country for the last 20 years (compared to the temperature norms of 1971 to 2000) increased by 1.5°C. The last ten years have been the hottest decade in Azerbaijan. As a result of climate change, water resources have decreased by 15 percent over recent decades. In Azerbaijan, growing water shortages are causing high vulnerability in a variety of sectors:

- Water resources
- Human health
- Agriculture
- Forestry

To ensure resilience to hazardous hydrometeorological events, modern early warning systems have been established.

Future climate scenarios for Azerbaijan have been developed with the support of experts from the Turkish State Meteorological Service. From all three models, calculations were made for four periods from 1970 to 2100 with RCP4.5 and RCP8.5 scenarios.

The first period covers 1971 to 2000 and acts as a base climate. The second scenario period covers 2020 to 2040. The third scenario period covers 2041 to 2070. The fourth scenario covers 2071 to 2098. The Intergovernmental Panel on Climate Change (IPCC) emission scenarios have been identified mainly in relation to demography, economy, technology, energy, and agricultural development.

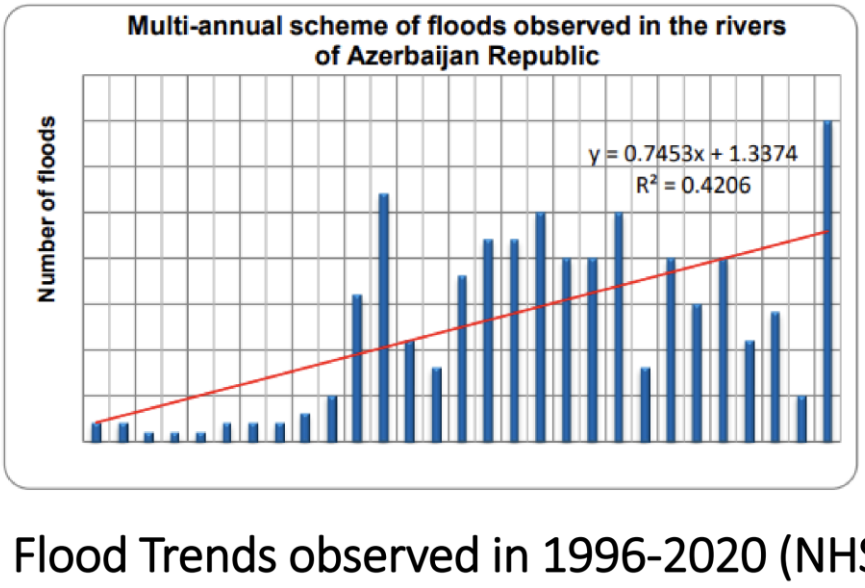
According to the HadGEM model, the average annual temperature is expected to increase by 1°C to 2°C in 2020 to 2040 (compared to 1971 to 2000), and the amount of precipitation to decrease by 10 percent to 20 percent in some areas, and increase by 10 percent to 40 percent in most areas.

The temperature is expected to increase by 2°C to 3°C in 2041 to 2070. In 2041 to 2070 (compared to 1971 to 2000), the amount of precipitation in the country will decrease by 10 percent, mainly in the highlands of the Greater Caucasus, Shirvan and Nakhchivan, and increase by 10 percent to 30 percent in most other areas.

Adaptation measures

- Establishment of the early warning system
- Modernization of observation systems
- Develop a hydrometeorology development strategy for 2025 to 2030
- Environmental pollution monitoring system

Figure 45 shows the increase in the incidence of floods in Azerbaijan from 1996 to 2020:



Flood Trends observed in 1996-2020 (NHS)

Figure 45: Flood trends in Azerbaijan, 1996-2020

Adaptation measures in the agriculture sector

To mitigate and reduce the negative effects of expected climate change:

- Cultivation of long-growing, heat-loving, drought-resistant agricultural crops adapted to the conditions of climate change in Azerbaijan.
- Creation and zoning of new varieties in this regard.
- Application of advanced irrigation methods in case of water shortage, use of alternative water sources.

- The establishment of field-protective forest strips around soil.
- Registration of eroded and saline soils and mapping.
- Creation of artificial water basins to capture atmospheric precipitation and use them for irrigation.
- Improving irrigation and drainage systems to combat salinization on farms.
- Establishment of small processing enterprises for perishable products in rural areas.
- Continuing work on the improvement of storage systems for agricultural products (warehouses, refrigerators, and so on) and creating new ones.

To mitigate and minimize the expected adverse effects of climate change on water resources the following measures are being taken:

- Reconstruction of existing water facilities to reduce water loss
- Involving additional water sources such as use of rainwater and treated seawater
- Use of recirculated water, including groundwater and water reuse
- Flow regulation and economical use of water in times of scarcity
- Conducting reforestation measures in torrent and flood-prone areas
- Implementation of protective engineering measures in basins and in river floodplains
- Construction of hydroelectric power plants (HPPs) on mountain rivers and new reservoirs
- Construction of small HPPs on existing irrigation canals
- Purifying and reusing water
- Use of modern irrigation and methods

Adaptation measures against diseases transmitted through water and food:

- Water treatment and quality improvement
- Improving and strengthening the water quality control system
- Accelerating the work on providing all settlements with drinking water
- Developing a strategy for the proper and efficient use of drinking water sources in the context of climate change
- Improving and strengthening the control system over the implementation of food storage standards
- Broadening sanitary-epidemiological awareness of the population in this issue
- If necessary, organizing speeches of specialists in the media on the prevention of acute intestinal infections

Key climate initiatives in Azerbaijan

Azerbaijan signed the Paris Agreement in April 2016 and submitted its NDC document to the Secretariat of UNFCCC in October 2015 with targets to achieve a 20 percent reduction in GHG levels by 2030 compared to the 1990 base year. At present, Azerbaijan has submitted an ambitious commitment in its NDC to reduce GHG by 35 percent by 2030. Energy, industry, agriculture, land use, forestry, and waste management are the current priority sectors for policymakers in Azerbaijan.

Climate change mitigation policies and measures

In September 2015, the Republic of Azerbaijan joined the Sustainable Development Agenda for 2016-2030, which was approved at the UN Summit on Sustainable Development in New York and launched the enforcement process for SDGs. There are 17 SDGs, 169 targets, and 232 indicators. Seven of the SDGs—SDG 6, SDG 7, SDG 11, SDG 12, SDG 13, SDG 14, SDG 15—deal directly with mitigation of environmental and climate change and other issues, and SDG 8 and SDG 9 touch upon the topic indirectly.

In 2016 the National Coordination Council for Sustainable Development of the Republic of Azerbaijan, in which the leadership of relevant state agencies (including the State Statistical Committee) are represented, was set up under the chairmanship of the deputy prime minister.

An important institutional measure to mitigate climate change impact is the establishment of the State Agency for Alternative and Renewable Energy Sources (SAARES) in 2013.

The National Strategy for Improving Solid Waste Management in the Republic of Azerbaijan for 2018 to 2022 was adopted on 1 November 2018. The National Strategy for Low-Carbon Development is currently being developed.

The measures taken to ensure the implementation of commitments made by the Republic of Azerbaijan in accordance with the United Nations Framework Convention on Climate Change were approved by the Republic of Azerbaijan on 3 November 2020.

Legal frameworks for measures to reduce GHG emissions

There is a national program on the restoration and expansion of forests in the Azerbaijan Republic. There is also a transport sector development strategy and a state program on the development of the fuel and energy sector in the Republic of Azerbaijan. The sources and categories of GHG emissions in the Industrial Processes and Product Use (IPPU) sector are:

- Mining products
- Chemical industry
- Metal industry
- Other production areas
- Production of halogenated carbon and sulfur hexafluoride

To reduce GHG emissions in the IPPU, there are some sectoral international conventions to which Azerbaijan is a party. These are:

- Convention on Environmental Impact Assessment in Transboundary Context (joined in 1999)
- Montreal Protocol on Substances that Deplete the Ozone Layer (joined in 2000)
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (joined in 2001)
- Stockholm Convention on Persistent Organic Pollutants (joined in 2001)

The agricultural sector ranks second in the country for the total share of GHG emissions after the energy sector. GHG emissions in this sector in 2014 accounted for approximately 14.32 percent of total emissions (excluding removals), and 14.1 percent in 2015.

Government programs

- State Program on Rational Use of Summer and Winter Pastures, Hayfields, and Prevention of Desertification in the Republic of Azerbaijan, 2004-2010
- State Program on Reliable Food Supply of the Population in the Republic of Azerbaijan, 2008-2015
- State Program on Poverty Reduction and Sustainable Development in the Republic of Azerbaijan, 2005-2008
- State Program on Social and Economic Development of Regions of the Republic of Azerbaijan, 2014-2018
- Strategic Roadmap for Production and Processing of Agricultural Products in the Republic of Azerbaijan, 2016-2022

Forestry

- The Food and Agriculture Organization (FAO) estimates that currently 1.2 billion hectares of the world’s land fund is already moderately and severely degraded.
- 20 percent of arable land, 30 percent of forests, and 10 percent of pastures are degraded globally.
- From the 17th century to the 19th century, 35 percent of the territory of Azerbaijan was covered with forests; currently, the total area of Azerbaijan's forests is only 1.021 million hectares, which is 11.8 percent of its original total area.
- For comparison, this figure is 44 percent in the Russian Federation, 41 percent in Latvia, and 39 percent in Georgia.

- Expanding the share of forested areas in the total land area to 12.5 percent by the end of 2015 is targeted in the State Program on Poverty Reduction and Sustainable Development in the Republic of Azerbaijan, 2008-2015.
- The National Strategy for Improving Solid Waste Management in the Republic of Azerbaijan, 2018-2022 envisages the establishment of regional solid waste management centers for all regional centers and cities of the country. At these centers, the waste will be burned in incinerators; this process will continue until 2030, with an additional 10 percent of the incineration rate each year.

Other initiatives and measures

- State Commission on Climate Change ensures the smooth coordination between all stakeholders in the field of climate change on a national level and contributes to the implementation of obligations under the United Nations Framework Convention on Climate Change.
- Ratification of the UN Framework Convention on Climate Change by the Republic of Azerbaijan in 1995 and the Kyoto Protocol in 2000.
- Commitments were made to the convention to provide a GHG institutional framework for assessing anthropogenic emissions and removals, and to report to the secretariat of the convention on an ongoing basis.
- The Action Plan between Azerbaijan and the EU within the framework of the European Neighborhood Policy for European Integration was adopted by the Government of Azerbaijan on 14 November 2006; it pays special attention to the development of statistics in Azerbaijan.

Paris Agreement

The obligations of the Republic of Azerbaijan arising from the Paris Agreement of the UN Framework Convention on Climate Change and the fulfilment of these obligations are among the priorities for the Government of the Republic of Azerbaijan. In general, the main goal of the responses taken by countries within the Paris Agreement is to keep the average value of the rise in global temperature well below 2°C for the next 100 years. COP29 will be held in Azerbaijan on 22 November 2024.

MRV systems for GHG inventory

A climate change center has been established within the Ministry of Ecology and Natural Resources (MENR) to coordinate the national GHG inventory. The center is responsible for collecting data from relevant government agencies as part of GHG inventory coordination, obtaining relevant opinions and suggestions on GHG inventory reports, and archiving data.

In 2014, the annual official statistical report 2-TG (air) 'On protection of ambient air' was complemented with a GHG inventory section to improve the MRV system for the GHG inventory for obtaining direct data from industrial enterprises. These reports are submitted online by industrial enterprises to the State Statistics Committee once a year upon the approval of the MENR.

The GHG inventory process was first carried out in Azerbaijan in 1998 to 2000 under the 'First National Communication Report for UN Framework Convention on Climate Change.' The GHG inventory of the report covered 1990 to 1994. The GHG inventory process for the following years was carried out under subsequent National Communication reports. Furthermore, a regional project on GHG inventory quality improvement was implemented with the assistance of UNDP-GEF in 2003 to 2006.

Concrete examples of measures taken to mitigate climate change

In 2019, by the initiative of the first vice president of the Republic of Azerbaijan, 650,000 trees were planted. Greening activities such as the establishment of modern agroforests are being implemented for the reduction of CO_2 emissions. Azerbaijan has also joined the Bonn Challenge with the commitment of restoring 270,000 hectares of forested land by 2030. Azerbaijan has set the target to increase the share of renewable energy in power generation by up to 30 percent by 2030 despite a long history of oil and gas industry development.

- **Case Study 1**

The 2019-2020 Action Plan for reducing the negative impact of plastic packaging waste on the environment in the Republic of Azerbaijan was approved by Decree No 935 dated 7 February 2019 of the president of the Republic of Azerbaijan. Based on the assessment of the negative impact of the mass use of plastic packaging products on plants, animals, land, and water resources to implement measures aimed at reducing pollution in this area, the action plan covers the strategic vision, the long-term vision for the period up to 2025, and the targeted vision by 2030. It provides for the implementation of large-scale measures to achieve efficient management and a high level of service. More than 250 containers have been put into use in densely populated areas of 37 cities and regions, including Baku, Sumgait, and Ganja.

- **Case Study 2: renewable energy projects**

Community-based adaptation projects

In the framework of the National Adaptation Plan project, financed by the Green Climate Fund and implemented by the United Nations Development Program in Azerbaijan in partnership with the Academy of Public Administration under the president of the Republic of Azerbaijan, the second phase of executive-level courses on climate change adaptation for civil servants has been successfully completed. These executive-level courses focus on vital topics such as 'The Essence of Climate Change Adaptation.'

Dedicated civil servants are now better equipped with the knowledge and tools to tackle the challenges of climate change. The training program on climate change adaptation was held on 22 to 26 July 2024 and invited employees from relevant government entities who participated successfully.

Conclusion

Azerbaijan's innovative and localized solutions contribute to climate resilience. The importance of collaborative efforts and continued investment in technology and community engagement cannot be overemphasized.

In the future, successful initiatives should be expanded and there should be an increased focus on sustainability and adaptation strategies. The only way to achieve positive results in reducing the impact on the environment is the consolidation of efforts of every country to ensure a safe and resilient future. No country on this planet will be able to act alone. We should use every opportunity which may lead to the development of regional interaction.

China case study

***Presenter**: Li Cangshu, Associate Research Fellow and Coordinator of the 'Dual Carbon' Project, Center for International Knowledge on Development, China*

This study covers the photovoltaic revolution in Qinghai and green buildings that were key to achieving Beijing's low-carbon Winter Olympics. In September 2020, China committed to peak CO_2 emissions before 2030 and strives to achieve carbon neutrality by 2060.

Qinghai

Qinghai—an important new energy industry base in China—is focusing on leveraging its abundant hydropower resources and sunlight advantages to vigorously develop the photovoltaic industry as a source of green and clean energy. Currently, photovoltaic power has surpassed hydropower to become Qinghai's primary energy source, and the province ranks first in China for centralized photovoltaic power generation.

Qinghai uses water–sun complementary adjustment technology to address the variability, randomness, and intermittency of photovoltaic power generation, converting unstable solar power into a balanced, high-quality, and reliable energy source. The province has also established a

photovoltaic industry technology innovation center, a photovoltaic new energy big data platform, and the country's first 100 MW national solar power base. By integrating new technologies, materials, and energy sources, Qinghai is driving the rapid development of the photovoltaic industry.

The Tarapand Green Industry Development Zone photovoltaic power station in Gonghe County, Hainan Tibetan Autonomous Prefecture, Qinghai Province

Figure 46: Tarapand green industrial development zone, Gonghe County, Qinghai Province

Mutual reinforcement of economy and ecology for a win-win outcome

The development of the photovoltaic industry also helps curb land desertification. Extensive solar panels block intense sunlight, reducing water evaporation and wind speed by over 50 percent, and significantly improving water conservation. Collaborating with the Institute of Cold and Arid Regions Environmental and Engineering Research, and a hydropower company, crops suited to high-altitude conditions like snow chrysanthemum, oats, and alfalfa are planted under the panels, tailored to local soil and water quality. Regular cleaning of the panels ensures water infiltration that supports the growth of high-altitude crops and desert vegetation, transforming previously barren land into vibrant green areas.

Poverty alleviation and the benefits of an increased income from solar production

In Qinghai, the profits from photovoltaic projects are allocated to village collectives, with each village earning about USD 42,000 annually. Of this income, 60 percent is used for education, infrastructure maintenance, and developing specialty industries. The remaining 40 percent is used to create public welfare jobs to support disadvantaged individuals. Nearly half of the population in Qinghai has escaped poverty through photovoltaic earnings.

Currently, Qinghai's clean energy consumption ratio reaches 81 percent, which is significantly above the national average. By the end of 2023, the province had a total installed power capacity of 54.97 million kW; this included 3.97 million kW from coal, 13.05 million kW from hydropower, 25.60 million kW from solar, and 11.85 million kW from wind. New energy sources account for 37.46 million kW or 68 percent of the total. In the future, Qinghai will continue to advance the transformation to cleaner energy, integrate ecological protection with emerging industries, and convert abundant solar power into a continuous source of green energy.

Green buildings: achieving Beijing’s low-carbon Winter Olympics

The Zhangbei to Beijing flexible DC grid—the first of its kind in the world—ensured the power supply for all Winter Olympic venues, marking the first time in Olympic history that 100 percent green electricity was used. Currently, wind and solar power from Zhangjiakou can deliver 14 billion kWh of green power to Beijing each year—about one tenth of the city's annual electricity consumption. 2020 marked Beijing's entry into the green electricity era, with all residents benefiting from and participating in clean energy. This achievement is equivalent to saving 4.27 million tons of standard coal and reducing CO_2 emissions by 11.65 million tons.

The National Speed Skating Oval uses smart construction technology, significantly shortening the main construction period and greatly reducing water, electricity, and material usage. The saddle-shaped single-layer cable net structure with unique light, thin, and flexible properties weighs only a quarter of traditional roofing, thereby reducing material use and construction complexity. The Wukesong Ice Sports Center's dehumidification system lowers energy consumption by about 50 percent compared to traditional methods. Both the design and technology of smart construction reduce carbon emissions from the source.

The Yanqing competition zone in Beijing adhered to an 'ecology first' principle, successfully restoring 1.85 million m^2 of construction land using techniques such as tree transplantation and topsoil removal. During construction, waste materials were repurposed for snow track embankments and landscaping, recycling about 300,000 m^3 of debris. Excavated stone was simply processed and reused as 'gabion walls' in various structures, significantly reducing waste and enhancing the local northern mountain village culture. The modular construction used in the Yanqing Winter Olympic Village reduced carbon emissions from onsite wet operations, lowered energy consumption, and increased post-event material recycling to 40 percent—thereby fulfilling the solemn pledge of achieving carbon neutrality for the Beijing Winter Olympics.

Mongolia case study

***Presenter**: Tuvshintugs Batdelger, Director, Economic Research Institute, Mongolia*

Climate change in Mongolia

Mongolia is highly vulnerable to climate change owing to its geographical location, sensitive ecosystems, and an economy heavily dependent on natural climate conditions. The country has extreme variations in air temperature and significant fluctuations in precipitation. Between 1940 and 2023, the annual average air temperature in Mongolia increased by 2.52°C, while total precipitation has shown a slight upward trend of 3.4 percent. This warming effect varies across different regions. Warming in Mongolia is occurring at a faster rate than the global average, which has increased by 0.74°C since 1906.

The impacts of climate change

Climate change and variability have become significantly apparent. Over the past 50 years, Mongolia has experienced the following impacts:

- Intensification of pasture degradation and desertification
- Decrease in diversity of plant species
- Contraction of wild animal habitats and a reduction in their populations
- Scarcity of water resources in the steppe regions
- Rise in the incidence of forest and grassland fires owing to aridification
- Increased frequency and intensity of droughts and harsh winters
- Increased frequency and intensity of disasters and hazardous events
- Number of disasters and hazardous events, and accidents excluding object fires, has increased 3.3-fold over the past 20 years. Financial damage has increased 8.4-fold, reaching MNT 320 billion in 2023.

Public participation

'The Third Sustainable Livelihood' (SLP-3) project 2015-2023—local development fund

The project was implemented by the Ministry of Finance between 2015 and 2023 with funding from international development organizations. The project aims to plan and execute priority investments, enhance governance and citizen and public participation in local communities, and support the implementation of the Budget Law, which is central to the government's decentralization policy. The project's target group is employees of government and administrative organizations and citizens of all 330 soums. Beneficiaries of the project will be the entire local population, who will benefit from improved, transparent, and effective management of public finances of the local government and the local development fund (LDF). A total of 2,054 initiatives related to climate change have been proposed under the LDF, with an implementation rate of 91 percent. These initiatives have been allocated a budget of MNT 131 billion.

***Dzud* (extreme weather event)**

Dzud events are characterized by the 'deterioration of the weather conditions in winter and spring leading to a shortage of pasture and water for livestock suffering massive die-off' (UN Mongolia, 2016)

- Deep snow, covering animals and food sources
- No snow but harsh cold, can freeze from exposure
- Waterlogging and inaccessible food owing to impenetrable ice caused by fluctuating temperatures

Owing to the impacts of climate change, aridification is intensifying, leading to reduced forage yields, decreased species diversity, and pasture degradation. Consequently, livestock are unable to fully regain their strength during the summer and autumn, which adversely affects their ability to endure harsh winters and other disasters.

Rangeland degradation: herd size vs. climate change?

Livestock herds and climate have both had statistically significant, negative impacts on rangeland biological productivity. Climate and weather impacts are now a larger order of magnitude than those of herd size; albeit less so in cooler, higher-elevation areas than in warmer, drier desert and semi-desert zones (Avralt-Od et al, 2023).

Dzud has had a severely adverse impact on national social and economic welfare. The massive loss of livestock means the collapse of the primary—if not the sole—source of income and livelihood for a large portion of the population. Drought and dzud have occurred for 27 of the past 50 years. The risk assessment for disasters, encompassing both dzud and consecutive drought–dzud events, indicates that the area with high risk of dzud is projected to increase by 14.4 percent compared to the 2020-2022 average, while areas with extreme risk are anticipated to rise by 3.4 percent by 2030.

2023/2024 dzud

In November 2023 and May 2024, Mongolia experienced the harshest dzud in the last 50 years. As of the end of February, 185,937 herder households—constituting 75 percent of all herder households—were directly or indirectly affected by the Dzud's impacts. About 100,000 herder families are considered the most vulnerable households. As of 7 March 2024, 1,344 herders had lost their entire livestock, and 18,859 herder families were on the *otor* movement.

The dzud affected over 188,300 people, including 80,215 children. 20 people, including two children, lost their lives in severe blizzards. The State Emergency Commission estimated the total livestock loss could reach 15 million by April 2024, based on the severity of the weather conditions and historical dzud data. From January to May 2024, the number of livestock lost reached 7.2 million, amounting to 11.6 percent of the total.

Prevention and warnings dissemination
The National Emergency Management Agency (NEMA), the legally designated authority for early warning dissemination in Mongolia, disseminates prevention and warnings for each of the 24 disaster types including dzud.

Forecast information
IRIMHE publishes medium- and long-term forecasts of dzud risk information every October in the form of a dzud risk map. This is distributed via the IRIMHE website, Facebook, SMS, TV and radio. Short-term forecast information can be seen on IRIMHE's dzud risk map, which is updated according to winter conditions; it is distributed via every provincial meteorological office's Facebook page and official website. Sudden weather changes are communicated as emergency information. Emergency information is often communicated by phone or SMS, and through Facebook groups. The information is transmitted as follows: provincial meteorological office→head of soum→head of bug→headers

Currently, information on weather-related disaster risks is sent to herders via SMS messages from administrative agencies. Given the high percentage of herders who have mobile phones, using SMS is more effective for information dissemination than applications like Facebook.

Solutions
One solution is to improve communication between administration and herders by upgrading SMS functionality that allows both sender and receiver to confirm information transmission. There can also be an improvement in the efficiency of information transmission through the development of a herders' database. In addition to the information submitted to the National Statistics Office of Mongolia (NSO) every year, basic information on herders will be linked to the SMS read confirmation system to link with dzud countermeasures. In addition, to organize information on the status of livestock breeding and sales, this information should be linked to the veterinary agency MAHIS system.

Local solutions (solar power meat freezing and preservation system)
The income of herders depends on livestock and livestock products; their productivity is unstable owing to the sudden decline in production and increase in expenditure because of the risk of natural disasters. Under normal circumstances, herders slaughter 20 percent to 25 percent of their livestock; however, in anticipation of dzud, this proportion increases to 30 percent to 35 percent. Most of the livestock slaughtered in anticipation of dzud are those in a poor condition, deemed unlikely to survive the winter. The price of meat from thin livestock tends to be lower. Herders face several challenges regarding livestock sales, including:

1) Fluctuating and low prices
2) Difficulty in finding direct buyers
3) Storage challenges
4) Remoteness from markets and transportation difficulties
5) Insufficient knowledge and information

There was a pressing need for the installation of freezer storage at soum level because 'difficulty in storage' was cited as an issue of livestock sales for effective use of the results of dzud predictions (Economic Research Institute, 2022).

Currently, a meat refrigeration and storage system utilizing solar energy (PV system) is being tested. Based on dzud forecasts, herders slaughter their livestock and store it in refrigerated units at district level. This is expected to improve the distribution of livestock products in Mongolia and strengthen the value-added chain. However, implementing sophisticated equipment, such as PV systems, at soum level can be challenging because of maintenance and management costs.

Green gold project
Of Mongolia, 70 percent is covered in grassland—known as green gold. The Swiss Agency for Development and Cooperation's (SDC's) Green Gold project, which aims to protect these pastures, has been implemented together with herders, Mongolian authorities, and other stakeholders since

2004. Herders enter grazing agreements, agreeing to manage their livestock numbers and load according to the pasture's carrying capacity. At national level, the Ministry of Food, Agriculture, and Light Industry (MOFALI), the General Authority for Land Administration, Geodesy, and Cartography (GALAGC), and the National Agency for Meteorology and Environmental Monitoring (NAMEM), along with local-level pasture-user groups (PUGs) and soum administrations, implement six critical steps of recovery-capacity-based pasture management based on collaborative efforts.

1. Organization of grazing user groups
2. Mapping of pasture conditions and recovery capacity
3. Pasture management plan
4. Implementation of the pasture management plan
5. Monitoring the effectiveness of pasture use and long-term monitoring
6. Disseminating trends in pasture conditions to the public

These efforts have resulted in the restoration of over 20 million hectares of fallow grazing land within 15 years. More than 92,000 herder families (about 30 percent of all herders) have made a contractual commitment to sustainable rangeland management.

New Cooperative—Wealthy Herder program

This program aims to prevent potential disasters in the livestock sector due to climate change and to support the sustainable development of livestock production and herders' cooperatives; the 'New Cooperative' movement has been initiated by the government. The ‘New Cooperative—Wealthy Herder’ initiative will be carried out as part of this movement to support herders affected by the 2023-2024 dzud and to mitigate the negative impacts of climate change on traditional livestock farming. The New Cooperative movement represents a comprehensive reform initiative extending beyond agriculture alone. As part of this program, herders will have access to subsidized investment loans. This financial support aims to facilitate the establishment of cooperatives and lay the groundwork for herders to become agricultural producers. Investments can be made in various areas including livestock feeding; by-product processing; veterinary services; development of water points; wool and hide preparation; primary processing; establishment and operation of warehouses and storage facilities for livestock products; and meat and dairy production.

Floods—local solutions

Within the framework of the capital city's Engineering Preparation Master Plan 2040, it is planned to complete and beautify the protective dam on the northern bank of the Tuul River in the densely populated areas of six central districts.

For flood control dams:

- 13 km in five locations along the Tuul River
- 10 km along the Selbe River
- A new 9 km dam is planned along the Uliastai River

To prevent the risk of possible flooding, the following measures are being taken in the vicinity of the Selbe River:

- Enforcement of the flood protection zone regime
- Evacuation of households from risk areas
- Clearance of land
- Creation of living conditions in the migration zone and organization of necessary measures. Also the removal and cleaning of silt, dirt, trees, and bushes along the Selbe River channel, and working to address the associated costs.

At the July 2023 meeting of the Metropolitan Governor's Council, a proposal was made to build an artificial lake and pond for storing flood water. The nationwide construction of floating ponds commenced in August 2023. As a result, floating ponds have been established in Uvurkhangai, Gobi-Altai, and Zavkhan provinces.

These projects include:

- A floating pond with a capacity of 11,745.6 m^3 was established at 'Ikh Bulangyn Am' in Narynteel Sum, Ovorkhangai Province.
- In Zavkhan Province, a floating pond—120 m x 50 m—with an earth dam was established in the steppe area, located 90 km from Uliastai Sum and 10 km from Tsagaanchuluut Sum.
- With the support of the World Conservation Fund, a floating pond was built in Darvi Sum. This embankment measures 36 m x 2.5 m x 3.5 m.

Water stress—local solutions

Of Mongolia's total water usage, 69.8 percent was allocated to electricity, gas, and heat production; 14.1 percent to agriculture; 3.7 percent to mining; 8.8 percent to other industrial production; and 3.5 percent to household use (NSO, 2022). Mongolian livestock and mining sectors depend on water. In the long run, water scarcity could become a major limiting factor for economic growth. In the Gobi region, there is a huge demand for water solutions. Government and water stakeholders should look for alternative water supply options that are sustainable and efficient.

Water transmission line projects

The Kherlen–Toono and Orkhon–Ongi Water Transmission Line Project is included in the 2024-2028 Government Action Program. This project aims to fully meet the water needs of the population, livestock, industry, and mining sectors in Khentii, Govisumber, Dornogovi, Dundgovi, and Umnogovi provinces by utilizing 5 percent to 9 percent of the annual average flow of the Kherlen River and Orkhon River through a closed pipeline.

Billion trees movement

By 2030, the movement will increase forest stock to 9.0 percent by planting, growing, and maintaining billions of trees.

Greenhouse farming

The government has been implementing a Food Supply and Security program since 2022. The program aims to increase greenhouse production to 270 hectares by 2026. The area of summer greenhouses will expand from 88 hectares to 188 hectares and the area of winter greenhouses will grow from 32 hectares to 82 hectares. Subsidized loans were provided to farmers to increase greenhouse production and MNT 39 billion will be allocated to subsidize these loan interest rates (Economic Research Institute, 2024). A green loan of MNT 12 billion was granted for a five-year period and favorable terms for the Dutch-style fully automated, four-season greenhouse project of ‘Tugs Urgats’ LLC.

Intensive animal farming

Owing to climate change, livestock productivity in Mongolia has been decreasing as a result of drought and arid conditions. Since 2017 the government has been implementing ‘The Intensive Animal Farming’ project. Nuudelchin Agro Farm LLC, in partnership with KHAN Bank and APU Dairy LLC, a leading national producer of milk products, is jointly implementing a model farm project that meets international standards for liquid milk production and farming. This project has established Mongolia's first cluster farm, comprising ten farms with a total of 400 cows. As a result, the milk produced on these farms is purchased and processed year round at stable prices and delivered to consumers.

Grey water use

Large beverage producing enterprises—including MCS, APU, and BiTse Trade LLC—are successfully treating and reusing grey water to irrigate the capital city’s green facilities. Mining companies also repurify and reuse the water they consume. For example, Oyu Tolgoi LLC extracts water from a depth of 150 m to 400 m, and 87 percent of this groundwater is reused. Additionally, through a wastewater reclamation system, 100 percent of the water used for car washing, domestic sanitation, and cooling is recycled. In 2019, a government decree on the use of grey water was issued. This order targeted mainly car washes but has not been fully implemented. As of May 2023,

grey water reuse equipment has been installed in 34 car washes across the capital city, although it is not yet fully utilized. Car washes continue to use clean water because the technological solution for grey water is not clear.

Natural disasters, migration, and air pollution

Challenges and difficulties arising from migration
Following the dzud—a natural disaster—migration towards Ulaanbaatar has sharply increased. Migration to Ulaanbaatar strains social services, worsens air pollution, leads to unsustainable land use, and exacerbates poverty and unemployment (IOM, 2018).

Air pollution—local solutions
As of 2024, approximately 160,000 households live in Ulaanbaatar's ger districts, which make up about 48 percent of the capital's households. These districts contribute around 31 percent of the city's air pollutants. Of ger district homes, 93 percent need insulation, making it essential to develop heat loss reduction solutions and financial products (Economic Research Institute, 2023).

Green loans for home insulation
One of the solutions to reduce air pollution is to improve insulation in ger district residences. According to the study, 52.6 percent of households plan to insulate their homes, with 22 percent of these households interested in using loans for the insulation. Government subsidies for improved fuels and reduced night-time electricity tariffs are contributing to the low interest in home insulation and the lack of knowledge about green loans among most residents (Economic Research Institute, 2023b).

The Passive House program
The Passive House program is an energy-efficient building standard that emphasizes high insulation, airtightness, and advanced ventilation systems. It aims to minimize energy use for heating and cooling, achieving up to 90 percent energy savings compared to traditional buildings. This concept is particularly relevant in cold climates like Mongolia, where it supports efforts to improve residential energy efficiency, reduce emissions, and promote sustainable construction practices. Although the program has high upfront costs, it significantly reduces energy consumption, GHG emissions, and air pollution, making it beneficial in the long term; however, many people lack the financial capacity to participate in this program. (Mongolian Passive House Institute NGO)

GIZ's energy-efficient building refurbishment project in Mongolia
GIZ's energy-efficient building refurbishment project in Mongolia has been implemented since 2013. The goal of the project is to support measures related to improving the quality of building insulation, reducing energy consumption, and protecting the environment.

Green and environmentally friendly building materials
Green building minimizes environmental harm, optimizes energy use, and ensures comfort, with benefits like reduced health impacts, lower energy use, and sustainable materials. Green buildings cut energy use by 25 percent and water use by 11 percent, combat carbon emissions and global warming, and are increasingly in demand worldwide, including in Mongolia where sustainable construction is crucial. In Mongolia, the use of green materials is rising, supported by the Green Development Policy and favorable loans, with green building loans reaching MNT 8.9 billion in 2023, although they remain a small portion of total construction loans.

Energy transition
The New Recovery Policy has the following aims:

- Connecting to the Northeast Asian integrated energy grid
- Achieving 30 percent renewable energy consumption by 2030
- Reducing GHG emissions by 7.3 million tons of CO_2

Mongolian government's 2024-2028 action program
Wind power projects up to 300 MW and solar power projects up to 200 MW will be implemented in phases with private investment (current capacity of wind power 155 MW, 2024). Related to new solar and wind power projects, over 200 MW of adjustable-mode battery storage systems will be built. Support will be provided for projects to build hydroelectric power plants in reservoirs and domestic rivers, which will be implemented with private sector investment. The development of renewable energy production and reduction in production costs will be prioritized.

Projects	Implementing organization	Period	Funding organization	Funding amount
Erdeneburen Hydropower Plant Project Capacity of 90 MW	Ministry of Energy	61 months	Discounted loan from the Export-Import Bank of China /EXIM/	266 million USD
Renewable energy enhancement	Ministry of Energy	2019-2027	Asian Development Bank	66 million USD

Table 16: Major renewable energy investments in Mongolia, 2024-2028

Subprojects of 'renewable energy enhancement'

- 2023, a 10 MW solar power plant in Yesonbulag Sum, Gobi-Altai Province
- 2022, a 5 MW solar power plant and a 3.6 MWh battery storage plant in Uliastai Sum, Zavkhan Province

The shift to coal briquettes in Ulaanbaatar was implemented to improve air quality by reducing harmful emissions from raw coal. The Tavan Tolgoi Tulsh state-owned company was established in 2018 to produce coal briquettes. The investment costs in 2018-2020 were MNT 269 billion (about USD 100 million). Improved briquettes are sold at discounted prices / 25kg = MNT 3,750 (about USD 1.10) and the total output was 1.5 million tons (2019-2023). The consumption of briquettes in Ulaanbaatar is 3,100 tons/day; however, the introduction of coal briquettes has resulted in higher SO_2 emissions compared to raw coal. The content of SO_2 gas has increased by 1.8 times during the winter months.

Tajikistan Case Study

***Presenter**: Jahongir Dehkonov, Director of PO 'Fund for Poverty Reduction'*

The Fund for Poverty Reduction was established in 2008; its mission is to 'support poverty alleviation initiatives in Tajikistan through active participation in the process of sustainable economic development and the social wellbeing of the population.' The organization has the following areas of expertise:

- Strategic planning
- Agriculture development
- Climate change adaptation
- Gender equality and empowerment
- Projects and programs evaluation
- Surveys and research

The key partners of the Fund for Poverty Reduction are the Government of the Republic of Tajikistan, ADB, WB, FAO, WFP, UNDP, UNFPA, GIZ, and WHH.

Globally important agricultural heritage systems
Globally important agricultural heritage systems (GIAHS) are agroecosystems inhabited by communities that live in an intricate relationship with their territory. These evolving sites are resilient

systems characterized by remarkable agrobiodiversity, traditional knowledge, invaluable cultures and landscapes, sustainably managed by farmers, herders, fisher folk, and forest people in ways that contribute to their livelihoods and food security.

Initiating the GIAHS candidacy process in Tajikistan required the following steps:

- Engaging the NGO Fund for Poverty Reduction to support the government in GIAHS application
- Establishing the national interagency working group on GIAHS
- Identifying potential GIAHS candidate sites
- Raising awareness among citizens
- Formulating the Almosi Valley GIAHS proposal
- Participatory planning of actions

Main criteria for application to GIAHS candidacy

1. Food and livelihood security
2. Agrobiodiversity
3. Local and traditional knowledge systems
4. Culture, values, and social organizations
5. Landscape features

Almosi Valley is an integrated agropastoral system adapted to mountain conditions. It is a diversified and resilient agropastoral system where a central role is given to the cultivation of the Pink Taifi grape known as 'Hisori' and livestock husbandry (focusing on Hissar sheep herding). Furthermore, other crops typical of mountainous regions are cultivated here, such as fruit, wheat, barley, oil crops, and vegetables. It is a system with a unique climate, traditional agropastoral knowledge and skills, values, culture and local social organizations with ancient history and contemporary relevance.

Criteria 1—food and livelihood security

1. The Almosi Valley is one of the most important agricultural heritage systems in Tajikistan, with agriculture as the dominant sector, contributing to the employment of more than half (56.7 percent) of the local population (including 43 percent of women).
2. Main forms of agricultural organization in the site are Dehkan farms, livestock farms, transhumant shepherds, and family home gardens.
3. Annual volume of agricultural production in 2022—TJS 92.96 million (USD 8.5 million)
4. TJS 82.02 million (USD 7.5 million) (88 percent) in the crop production sector
5. TJS 10.94 million (USD 1 million) (12 percent) in the livestock production sector

Farming, food, and economic subsistence are based on the following pillars:

1. Viticulture (Pink Taifi grapes Hisori, Zarifi, Kishmish, Husaini)
2. Fruit production (apples, pears, cherries, peaches, apricots, hawthorns, figs, pomegranates, plums); animal production (sheep, goats, cattle, horses)
3. Cereal and fodder production (wheat, barley, rice)
4. Oil crops (linseeds); vegetable production (potatoes, onions, carrots, beets, pumpkins, cabbage, radishes, garlic, tomatoes, cucumbers, eggplants, bell peppers, chili peppers, chickpeas, beans); beekeeping production (honey)
5. Processing of food products (dried fruits, canned vegetables and fruits, flour and oil production)
6. The local population, in addition to their main type of activity, produces byproducts that also contribute to their livelihood.

Criteria 2—agrobiodiversity

1. Currently, more than 85 species and 360 varieties of cultivated plants are planted in Almosi
2. There are three main agroecological zones based on the mountain belts and agricultural uses:
    - Plains: located at an altitude below 1,000 m
    - Foothill belt: rain-fed lands located at altitudes from 1,000 m to 1,500 m
    - Mid-mountain belt: lands located at altitudes from 1,500 m to 2,000 m

- High-mountain belt: lands located at altitudes from 2,000 m

Criteria 3—local and traditional knowledge systems

- Livestock breeding
- Sheep grazing: permanent (year-round) grazing and Transhumant herding
- Cow grazing
- Plant production: grapes, orchards, cereals, and oil seeds
- Water management
- Traditional water mills and oil churns
- Folk calendar and time counting
- Home gardens

Criteria 4—culture, values, and social organizations

- Mahalla and Mahalla committees
- Agricultural and pastoral rituals (Navruz festival; Mehrgon festival; Sada festival)
- Family and household customs (childbirth and hilla)
- Wedding customs and traditions; Tirgon festival; Snowdrop festival—Boychechak; Tulip festival—Sairi Guli Lola; National sport Gushtin and Buzkashi (an ancient Tajik horse game)

Criteria 5—landscape features

- Climate: formed by the circulation of air masses common to Central Asia
- Natural ecosystems and their interconnections
- Rivers and riverbanks
- Glaciers
- Mountains
- Agricultural landscapes: (pasture; grape terraces; home gardens)
- Built heritage (Hisor Fortress and Madrassah)
- Rural settlements and typical houses

Action plan for dynamic conservation

Main objective:
The aim is for the Almosi agropastoral system to be more resilient to climate change shocks and stresses by 2030. Furthermore, there should be proper food security and secure livelihoods for communities that are adequate, locally led, and have a sustainable capacity. If these goals can be achieved, this will ensure the gradual maintenance and conservation of traditional agropastoral systems, mountain nature, agrobiodiversity, landscapes, and wildlife for the next generation.

Expected project in the area of climate change adaptation
*Project***—**Building Resilience Through Cash for Assets Under the Tajikistan Food Security Safety Net Activity

*Purpose***—**increasing the resilience of target communities, improving their socioeconomic wellbeing and food security by providing targeted technical assistance to create productive assets for poor people suffering from malnutrition and empowering them.

Key activities

1. Activity 1: support in enabling favorable institutional foundation for partnership on local level for effective coordination and making key decisions on creation of productive assets
2. Activity 2: support in sensitization, identification, verification, and registration of the potential beneficiaries
3. Activity 3: capacity development and skills building on creation of productive assets
4. Activity 4: technical support for the implementation of innovative community-based asset creation projects

Turkmenistan case study

***Presenter**: Mr Gurbangeldiyev Begli Dovrangeldiyevich, Senior Researcher, Scientific Laboratory of the International Science and Technology Park of the Academy of Sciences of Turkmenistan (Production and Energy-Saving Technologies)*

Turkmenistan is among the countries most vulnerable to climate change. It is experiencing high levels of aridity and the vegetation is being affected. In the context of global warming, the most vulnerable territory is the Karakum Desert and the question of adaptation in this region is a priority. Livestock is one of the key industries in the country and there are several interdependencies between water, livestock, and energy. Livestock breeding is a significant contributor to food security in the country and, unless measures are taken, it will have a terrible effect on stability.

It is important to use water effectively; one example is the construction of sardobas, which are water collection facilities. In this context, one of the examples is the construction of these pits. These sites are one of the biggest watering areas for livestock in Karakum. Owing to climate change, many sardobas have been destroyed. As a result, there were not enough sardobas to collect rainwater and those that have been destroyed have not been repaired effectively. Farmers have suffered because they cannot take their livestock there.

Sheep and livestock must be taken to other places instead and the burden on them is significant; it leads to desertification. Sardobas are constructed with the help of international organizations including the United Nations Development Program (UNDP) and CAREC. In regions where access to electricity is limited, sardobas have been reconstructed using solar panels, which are also environmentally friendly. Energy is used to pump water out for sustainable grazing. Pumping water helps to conserve grazing areas. Revegetation was the second stage of these projects. In some projects, concrete platforms have also been installed. The positive results of these projects have enabled the use of water more efficiently in desert areas. Once these restoration projects have been completed, people do not need to migrate to other areas. Several pilot zones with similar projects have been created. These projects make up about 87 hectares in total.

Uzbekistan case study

***Presenter**: Ezoz Ozodov, Manager of the Innovation Cluster for Sustainable Development, TIIAME National Research University, Uzbekistan*

Navigating Uzbekistan's future: challenges and opportunities

Over the past few decades, average temperatures in Uzbekistan have increased by 1.5°C, which has exacerbated water scarcity. This is particularly concerning for agriculture, which consumes more than 90 percent of the country's water supply. Most regions in Uzbekistan are suffering from a water deficit. Over 3 million hectares of land suffer from water erosion and, over the course of a season, the average loss of fertile soil owing to this reason reaches 80 tons. Based on climate change, the ratio of rainy days for water collection has decreased to 27 percent.

Smart agriculture: cultivating a prosperous future for Uzbekistan

Uzbekistan stands at the cusp of a technological revolution in agriculture. As the country seeks to address the challenges posed by climate change, water scarcity, and the need for sustainable growth, embracing advanced technologies has become imperative. Smart agriculture is not just a trend—it is the future of farming, offering innovative solutions that can transform the agricultural landscape of Uzbekistan. Three cutting-edge technologies are driving this transformation:

- Self-driving electric trucks: revolutionizing the transportation of agricultural goods with eco-friendly, autonomous vehicles that enhance efficiency and reduce costs.
- Self-driving helicopters: these bring precision to aerial farming tasks such as spraying and monitoring, ensuring that every inch of farmland is utilized to its fullest potential.
- Drone monitoring systems: providing real-time, data-driven insights into field conditions, enabling farmers to make informed decisions that maximize yield and minimize resource use.

Self-driving helicopters: revolutionizing aerial farming

- Autonomous operation: covers up to 500 hectares per day with precise, GPS-guided flight paths.
- High-resolution imaging: equipped with 4K cameras and multispectral sensors for real-time crop health monitoring.
- Precision spraying: reduces chemical usage by 30 percent with targeted application, leading to better yields and lower costs.
- Efficiency gains: cuts labor costs by 50 percent, with a response time to agricultural issues improved by 40 percent.
- Sustainability: enhances resource management, contributing to a 20 percent increase in overall farm productivity.
- Self-driving helicopters are leading the way in smart agriculture, making farming in Uzbekistan more efficient, sustainable, and profitable.

Driverless electric tractor

This is an electric power driven special agricultural tractor with an automatic control system; it is fast and compact. With a speed of 100 km/h it covers 200 km with a power of 1 stroke. It has high productivity, and it makes it possible to plow and level 0.5 hectares of land in two hours. The price of this tractor can compete with other state-of-the-art technologies and costs up to 18 percent less.

Pilot project: smart agriculture

A pilot project of smart agriculture has been created using systems of management, monitoring, and data processing. In the showroom the full concept of a pilot project of smart agriculture is presented by the online monitoring of technology applications at scientific and educational sites.

Unlocking agricultural potential in Uzbekistan through strategic partnerships

Uzbekistan's agricultural future hinges on strong strategic partnerships that drive innovation, sustainability, and economic growth.

- Innovation and technology—collaborating with global tech leaders can allow for the integration of AI-driven farming, precision agriculture, and advanced irrigation, boosting yields by 30 percent and optimizing resources.
- Sustainability—partnering with environmental experts will promote eco-friendly practices, reducing chemical use, and leading the region in sustainable farming.
- Knowledge transfer—joint ventures with top agricultural institutions can build capacity, ensuring the sector’s resilience and competitiveness.

Five hectares of land have been allocated as a pilot area for precision farming project studies. A smart farm water management and precision farming joint Uzbek–Chinese applied project is being conducted. Irrigation techniques and smart sensors and units (worth USD 100,000) were brought from China and installed. Universities in Uzbekistan and the US Lindsay/Zimmatic company installed central-pivot sprinkler irrigation technology on 7.2 hectares of land on the research farm and an education and research project are being conducted.


S.SOHAIL H. NAQVI
KABIR JURAZODA

DAY TWO

SESSION VII: FIXING CLIMATE FINANCE

The provision of adequate financing is the principal enabler for effective climate action. The global drive towards decarbonization demands ever-increasing volumes of investment spanning considerable timeframes. However, the stark disparity between global multilateral commitments and disbursements poses a significant challenge, dissuading developing nations from eliminating carbon subsidies to create fiscal space for transitioning towards greener economies. Particularly in the CAREC region, where countries embarked on their decarbonization journey with comparatively lower income levels, this strains their already limited resources. Navigating this challenge necessitates an all-stakeholders approach for the development of strategies and mechanisms to empower developing countries to mobilize sufficient financing for alleviating the climate challenge.

An underdeveloped capital market and the near absence of a carbon credit market in the CAREC region amplify the challenge. Creating a conducive policy environment and implementing business-friendly regulations could incentivize private sector engagement in climate action for bridging the enormous financing gap. The speakers delivered presentations on session topics (20 minutes each) and the moderator will lead and facilitate the discussion (30 minutes) by inviting participant comments, feedback, and questions.

***Moderator**: Akiko Terada-Hagiwara, Principal Country Specialist, ADB*

Bridging sustainable financing gap: role of development partners, governments, regulators and private finance entities

***Speaker**: Subathirai Sivakumaran, Chief of Section, Financing for Development Section, Macroeconomic Policy and Financing for Development Division, United Nations Economic Commission for Asia and the Pacific (UNESCAP), Thailand*

This presentation focused on sustainable finance and bridging the gap in Asia and the Pacific. It was broken down into an introduction, what policymakers can do, what regulators can do, what private finance can do, and ten principles for action to bridge the sustainable finance gap in Asia and the Pacific.

Country	GDP (USD Billions, 2023)	GDP per capita (USD, 2023)	GDP growth (2023)
The Islamic Republic of Afghanistan *(2022)*	14.5	352.6	-6.2%
The Republic of Azerbaijan	72.36	7,155.1	1.1%
The People's Republic of China	17,794.78	12,614.1	3.0%
Georgia	30.54	8,120.4	7.5%
The Republic of Kazakhstan	261.42	13,136.6	5.1%
The Kyrgyz Republic	13.99	1,969.9	6.2%
Mongolia	19.87	5,764.8	7.0%
The Islamic Republic of Pakistan	338.37	1,407.0	0.0%
The Republic of Tajikistan	12.06	1,189.0	8.3%
Turkmenistan	59.89	9,190.7	6.3%
The Republic of Uzbekistan	90.89	2,496.1	6.0%

Table 17: CAREC economic outlook

Country	GDP (USD Billions, 2023)
The Islamic Republic of Afghanistan *(2022)*	14.5
The Republic of Azerbaijan	72.36
The People's Republic of China	17,794.78
Georgia	30.54
The Republic of Kazakhstan	261.42
The Kyrgyz Republic	13.99
Mongolia	19.87
The Islamic Republic of Pakistan	338.37
The Republic of Tajikistan	12.06
Turkmenistan	59.89
The Republic of Uzbekistan	90.89

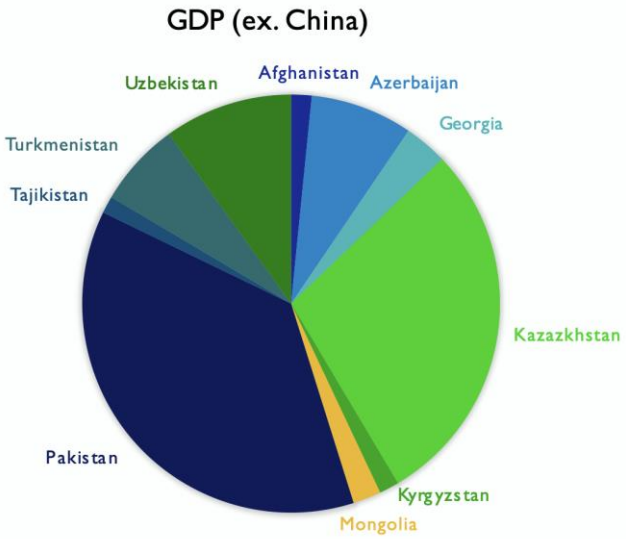
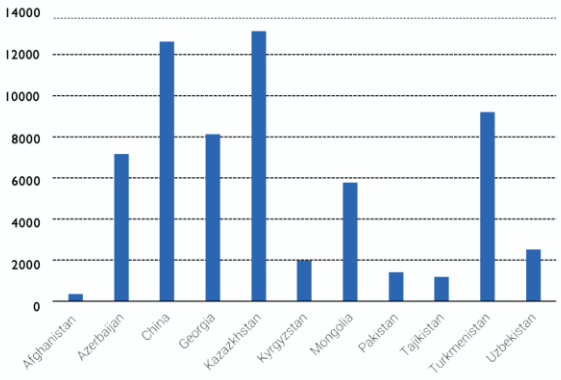


Figure 47: Share of GDP by country in the CAREC region, 2023

Country	GDP per capita (USD, 2023)
The Islamic Republic of Afghanistan *(2022)*	352.6
The Republic of Azerbaijan	7,155.1
The People's Republic of China	12,614.1
Georgia	8,120.4
The Republic of Kazakhstan	13,136.6
The Kyrgyz Republic	1,969.9
Mongolia	5,764.8
The Islamic Republic of Pakistan	1,407.0
The Republic of Tajikistan	1,189.0
Turkmenistan	9,190.7
The Republic of Uzbekistan	2,496.1



Source: World Bank, accessed 26/07/2024

ESCAP
Economic and Social Commission for Asia and the Pacific

Figure 48: GDP per capita across CAREC countries, 2023

Mind the (financing) gap: substantial and rising estimates of financing requirements to meet countries' climate ambitions.

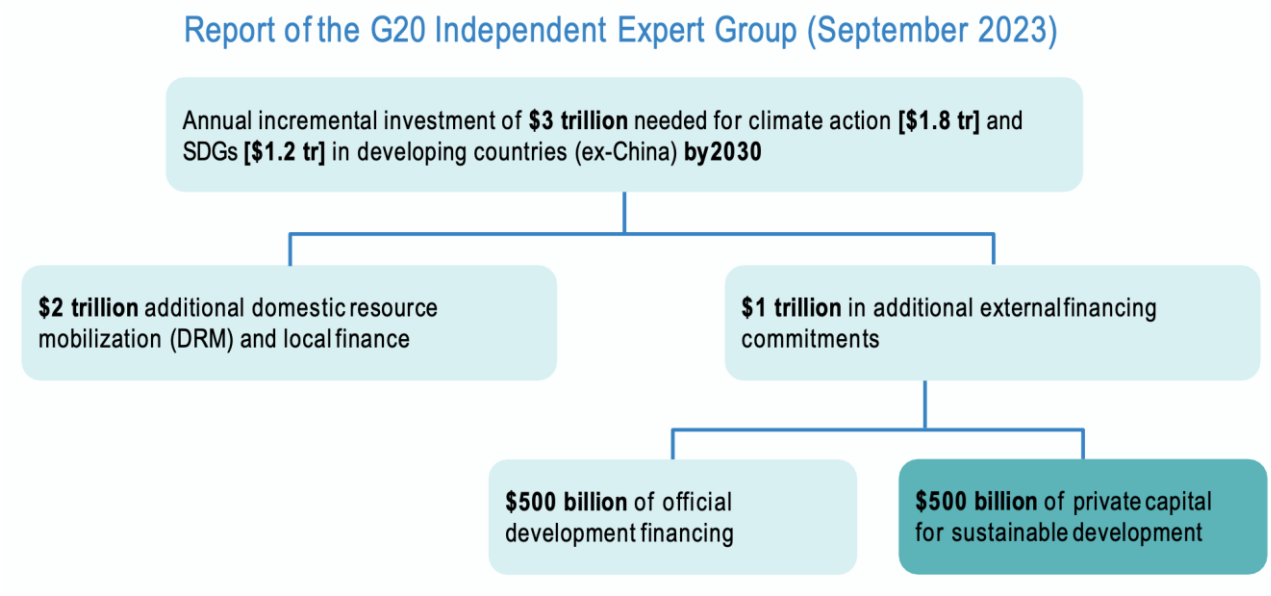


Figure 49: G20 recommendations for financing climate and development targets, 2023

Regional Infrastructure Investment Needs
CAREC, Beyond 2020

Sector	Sub-sector	Investment Need (USD billions)
Transport	(total)	37.5
	Rail	24.6
	Road	10.2
	Air	1.4
	Maritime	1.1
	Logistics	0.2
Trade facilitation		1.3
Energy		40.9
ICT		-
Other Sectors		-
Total		79.7

CAREC infrastructure investment needs based on ADB - Operational Plan for Regional Cooperation and Integration

National Infrastructure Investment Needs
Central Asia & People's Republic of China, 2016 - 2030

Estimate	Scenario	Region	Investment Need (USD billions)	Annual Average (USD billions)	As % of GDP
Baseline		Central Asia	492	33	6.8%
		PRC	13,120	875	5.0%
Climate-Adjusted	Low Growth	Centra Asia	526	35	7.9%
		PRC	14,097	940	5.9%
	High Growth	Central Asia	605	40	7.6%
		PRC	16,504	1,100	5.7%

- National infrastructure investment needs calculated as a function of: existing physical infrastructure stock, GDP per capita, shares of agriculture and industrial value-added of GDP, urbanization rate, and population density. Uses 2015 prices
- Central Asia: [Armenia], Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan
  - (Excludes Afghanistan, Georgia, Pakistan)
- Climate-adjusted estimate accounts for additional climate change mitigation (2 degrees) and adaptation infrastructure needs ("climate-proofing" the covered sectors and investing in irrigation, food security etc.)

	Low growth rate	High growth rate
PRC	4.6%	6.6%
Central Asia	2.1%	4.1%

ESCAP Economic and Social Commission for Asia and the Pacific

Source: ADB - Meeting Asia's Infrastructure Needs (2017)

Table 18: Projected infrastructure financing requirements: CAREC and PRC

Infrastructure investment needs—ADB estimates

In the CAREC region we know that we need more financing, but at the same time there are many pressures, which have led to a higher cost of capital. In our research we say that USD 3 trillion is needed but also that it is available. Challenges. There is promising movement here in the CAREC region. Regulators also have a very important role in shifting private capital towards climate action; however, it seems that they are lagging in this regard. Climate-related disclosures are gaining momentum. In CAREC there are a large number of companies that are making disclosures. Recommendations for regulators. What can private finance do? Asian banks and companies are still considerably slow to make net zero commitments. Lending to fossil fuel and coal in the region is still

on the rise. Coal is a particularly new problem. In the CAREC region, Habib Bank and Bank of East Asia Limited have set a net zero goal. Asia–Pacific is still predominantly a loan market. There must be an effort to see more of these loans go more towards sustainable and green markets. Asia's growing energy demand requires private finance. There is a lack of regulation and a lack of local currency financing. There has been huge discourse over the last two years over MDBs and IFIs. What can private finance do? Recommendations consist of ten principles.

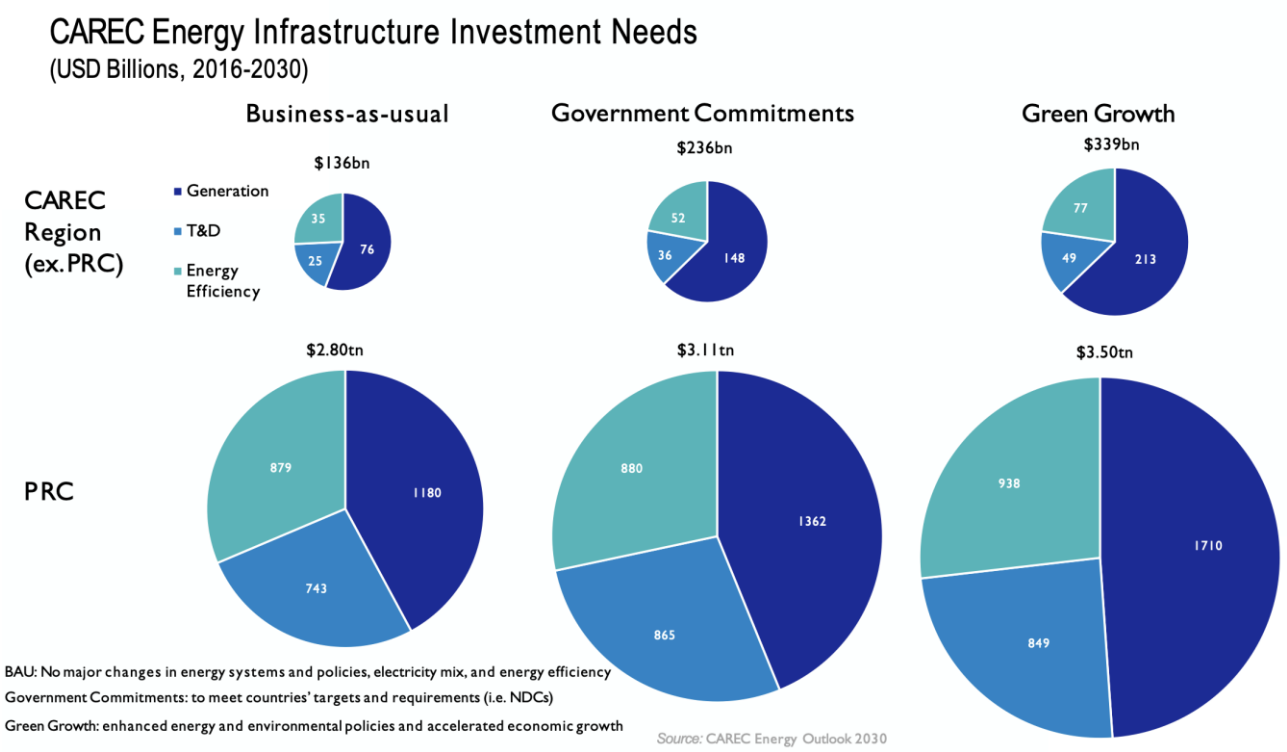


Figure 50: Energy infrastructure investment scenarios in CAREC and PRC, 2016-2030

CAREC energy infrastructure investment needs

Government, bilateral donors, multilateral and financial institutions must work together to help close the current gap.

Figure 51: Pathways for official development financing from G20 report, 2023

There is currently a challenging macroeconomic environment owing to rising inflation and interest rates, which contributes to the higher cost of capital for sustainable and climate investments. There are double-digit inflation rates in several Asia–Pacific economies in 2022, exceeding central bank rates. There are also rising interest rates driven by monetary tightening in advanced economies and domestic inflationary pressures. Downward pressure on exchange rates has also led to an outflow of capital to safe havens. All these conditions lead to higher risk premiums and borrowing costs.

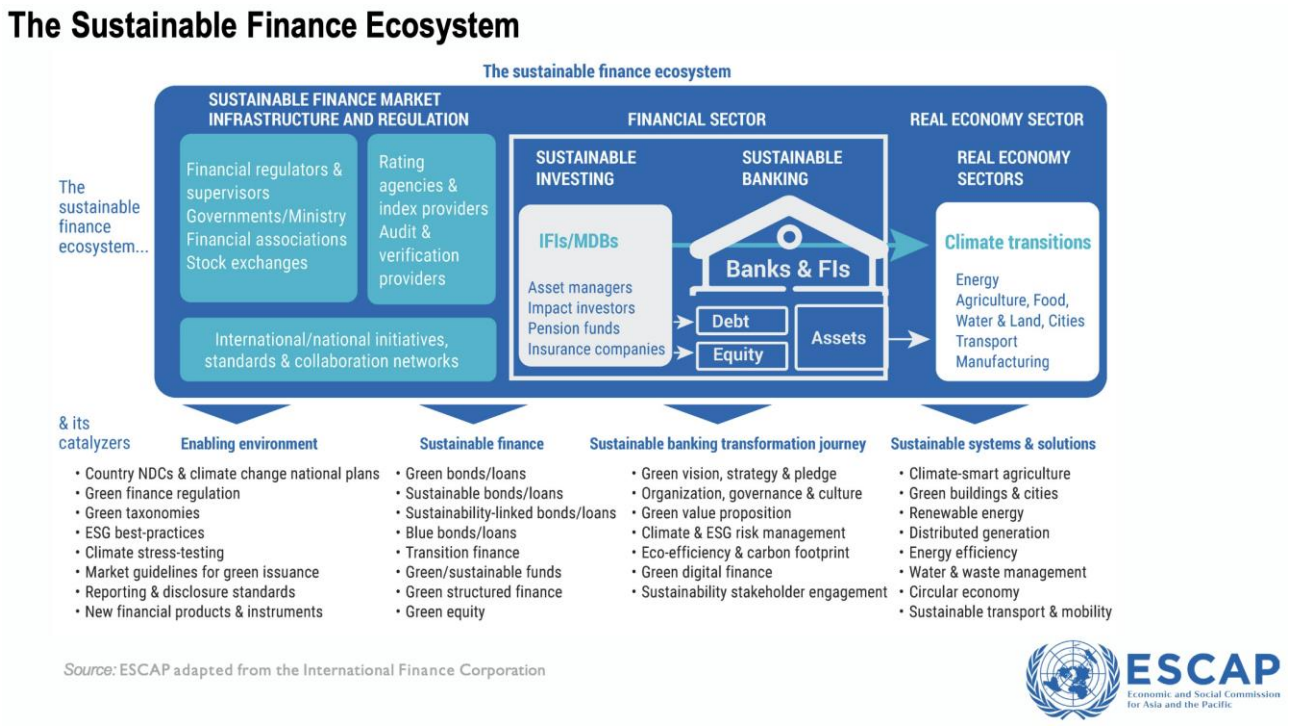


Figure 52: Sustainable finance framework: key sectors and processes

What can governments do?

Governments have a role to signal credible intentions and present national climate action priorities to markets. The instruments and tools available are:

- Sustainable finance roadmaps
- Sustainability labeled (GSS+) bonds
- Carbon markets
- Debt for nature and debt for climate swaps
- NDC financing strategies
- Access to multilateral climate funds

There is also a need for coherence between policy commitments and regulatory frameworks. However, there are also challenges faced:

- Limited availability of country NDC financing needs and ambitious NDC financing plans
- Rapidly changing sustainable finance landscape
- Lack of harmonization to access different climate finance sources
- Sovereign credit ratings and lack of local currency options
- Lack of bankable green project pipelines
- Limited technical capacities across project cycle
- LDCs and SIDS have specific challenges and vulnerabilities to attract private finance and access multilateral climate finance

The tools that can be used to address these challenges include, but are not limited to, the following:

- Sustainable finance roadmaps
- GSS+ bonds
- Carbon markets
- Debt for nature and debt for climate swaps

- NDC financing strategies
- Access to multilateral climate funds

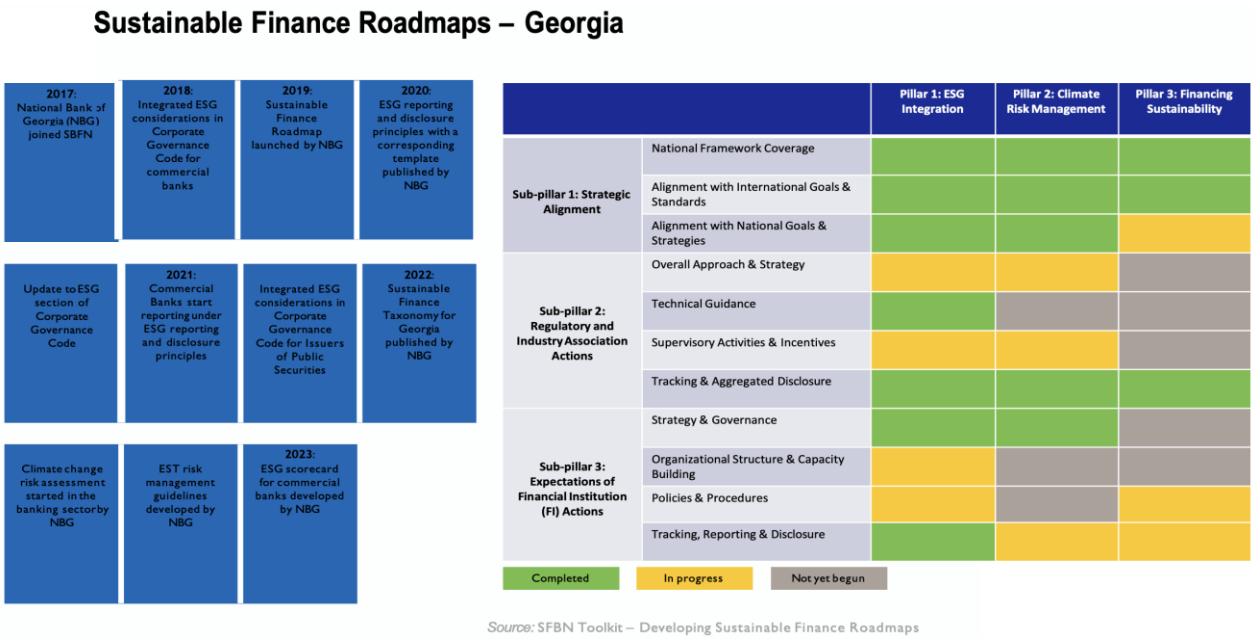


Figure 53: Roadmap for sustainable finance in Georgia:

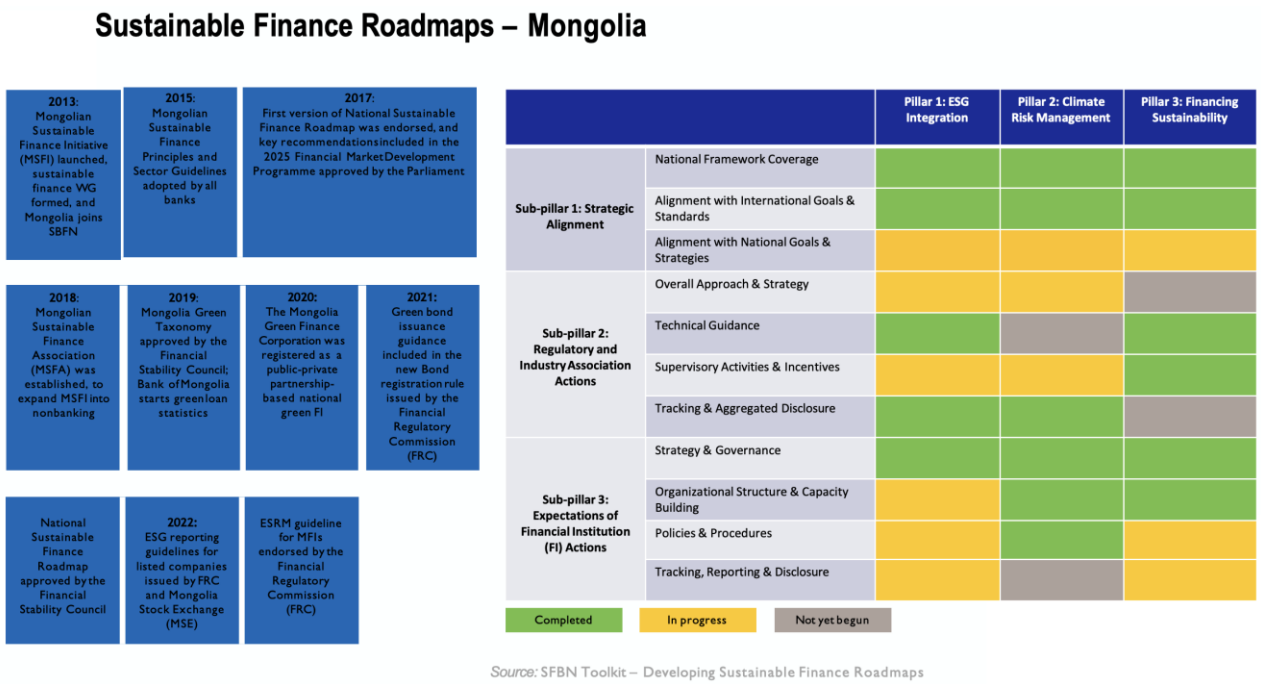


Figure 54: Roadmap for sustainable finance in Mongolia

International Carbon Credit Markets

Country	Clean Development Mechanism	Gold Standard	Verified Carbon Standard
The Islamic Republic of Afghanistan			
The Republic of Azerbaijan	0.1		
The People's Republic of China	1,195.6	29.4	180.7
Georgia	1.5		0.4
The Republic of Kazakhstan			0.1
The Kyrgyz Republic			
Mongolia	1.6	1.4	0.6
The Islamic Republic of Pakistan	16.5	0.2	4.4
The Republic of Tajikistan			0.3
Turkmenistan			0.2
The Republic of Uzbekistan	17.9		

Issuance

Carbon credit issuance in millions; cumulative to-date
One credit permits the emission of one metric ton of CO_2e

Source: World Bank (preliminary

ESCAP Economic and Social Commission for Asia and the Pacific

Table 19: Carbon credit issuance in CAREC countries by mechanism

Table 20: National carbon taxes and ETS implementation in the CAREC region

National Carbon Credit and Compliance Mechanisms

Country	National Carbon Tax	National ETS	National carbon-crediting mechanism
The Islamic Republic of Afghanistan			
The Republic of Azerbaijan			
The People's Republic of China		China National ETS (2021)	China GHG Voluntary Emission Reduction Program (2014)
Georgia			
The Republic of Kazakhstan		Kazakhstan ETS (2013)	Kazakhstan Crediting Mechanism (2013)
The Kyrgyz Republic			
Mongolia			
The Islamic Republic of Pakistan		Pakistan ETS	
The Republic of Tajikistan			
Turkmenistan			
The Republic of Uzbekistan			

Implemented
Under Consideration

ETS - Share of jurisdiction's emissions covered
China National ETS 31.9%
Kazakhstan ETS 47.0%

China also has regional emissions trading schemes
One credit permits the emission of one metric ton of CO_2e

Cumulative Carbon Credits Issued
China 77 million
Kazakhstan 1.1 million

Source: World Bank (preliminary data)

ESCAP Economic and Social Commission for Asia and the Pacific

Table 20 shows the national carbon credit and compliance mechanisms for the CAREC region and CAREC member country rankings in international carbon credit markets.

Asia and the Pacific received USD 183.7 billion in climate finance between 2016 and 2021 from bilateral sources, MDBs, and multilateral climate funds. Adaptation finance in Asia and the Pacific doubled between 2016 and 2021 but remains small compared to mitigation (>70 percent). Over half of climate-related finance remains concentrated in the transport, storage, and energy sectors. Much of this financing has been debt creating, which is a concern when countries are already experiencing increased indebtedness. Multilateral climate funds are a critical source and channel for developing countries—although insufficient to close the current financing gap. The GSS+ bonds market in Asia–Pacific reached USD 206 billion, showing both growth and diversification, as well as resilience against macroeconomic challenges. Green bonds hold the largest share of total GSS+ bond issuances. By the end of 2022, 22 countries had issued GSS+ bonds. There was promising growth in sustainability-linked and transition bonds in 2022. There is higher local-currency issuance of GSS+ bonds, signaling the uptake of GSS+ bonds by local investors. There are a growing number of sovereign issuances, although corporates dominate the market. Interestingly, there are also growing GSS+ issuances by countries with less developed financial systems.

What can governments do?

Governments can develop effective and coherent NDC financing strategies with interim 2030 and 2040 targets and clear resource mobilization plans. Furthermore, they can support the development of a pipeline of bankable projects that fit the volumes, scales, and risk-return profiles of MCFs, MDBs, DFIs, and private investors. Governments can lend support to the financial sector and the private sector to plan proactively for the net zero transition, with a focus on opportunities for local currency financing. The adoption of a conducive taxation regime and public financial reforms towards the net zero transition and further aligning policy coherence can also go a long way. Governments should also advocate for MDBs and bilateral development financial institutions to increase local currency lending. National governments should also consider building climate finance partnerships, like the JETP model.

What can regulators do?

Regulators have a critical role in managing climate-related financial risks and shifting capital towards the green transition. Regulators can achieve this through the following tools/measures:

- Macroprudential supervision
- Ensuring financial stability
- Climate and nature-related disclosures and data
- Micro prudential supervision of financial institutions
- Monetary policy

Climate-related disclosures are gaining momentum. Asia–Pacific ranks second globally for climate-related financial disclosures, while nature-related disclosures have yet to become mainstream. In Asia–Pacific, 1,956 organizations are members of the Task Force on Climate-Related Financial Disclosures (TCFD), which is 40 percent of the total.

Table 21: Corporate GHG emission disclosures in CAREC countries, 2022

Direct Corporate GHG Emission Disclosures to CDP

Country	No. of Disclosing Companies
The Islamic Republic of Afghanistan	3
The Republic of Azerbaijan	18
The People's Republic of China	1,714
Georgia	18
The Republic of Kazakhstan	72
The Kyrgyz Republic	8
Mongolia	12
The Islamic Republic of Pakistan	64
The Republic of Tajikistan	6
Turkmenistan	4
The Republic of Uzbekistan	17

CDP (formerly the Carbon Disclosure System) is an international non-profit that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. It is aligned with the TCFD recommendations.

Coverage Rate (as classified by CDP)

Moderate | Low | Limited

Disclosures data last updated 2022

Source: CDP – Corporate Environmental Tracker

ESCAP Economic and Social Commission for Asia and the Pacific

How are regulators supporting government priorities and shifting capital to low-carbon investments? Regulators are performing this role through:

- Green bond frameworks
- ESRM
- Green and sustainable finance taxonomies
- Sustainable finance roadmaps
- Direct lending policies towards green objectives
- Green incentives for issuers and borrowers

The global baseline disclosure standards of the International Sustainability Standards Board, released in June 2023, will take a further step towards taxonomy unification and allow for comparability and interoperability between taxonomies across the region.

What can regulators do?

Regulators can take the following steps:

1. Facilitate the interoperability of taxonomies across countries to reduce compliance costs
2. Ensure the alignment of roadmaps, taxonomies, and sustainable finance frameworks put forth by regulators with policymakers' commitments, especially the NDCs
3. Ensure a fair and predictable enforcement of current green finance requirements, including ESRM
4. Strengthen monitoring, reporting, and verification capacity in markets
5. Consider joining peer learning based international alliances—Network for Greening the Financial System (NGFS)
6. Consider making regulations on green finance mandatory

What can private finance do?

Asian banks and companies are still considerably slow to make their net zero commitments. Of companies in Asia–Pacific, 8 percent have set a net zero goal. Lending to fossil fuels and coal in the region is still on the rise and is larger compared to other geographies on the globe. There are 5,000 coal-fired power plants in Asia–Pacific, which will require financing for an early phase-out. Private finance is the major funding for financing clean energy investment, but bankability issues persist. In Asia and the Pacific banks are still at the frontline in the transition to net zero. Asia–Pacific is

predominantly a loan market, with a total asset size of the top 50 largest banks in Asia alone over USD 56.5 trillion as of April 2023. Sustainability-linked lending is growing, which allows for more flexibility and 'unrestricted' funding, if structured and verified well.

Asia's growing energy demand requires significant private finance for the climate and energy transition but there are multiple challenges. There is inadequate project preparation support to ensure that projects meet the risk-return-mandate requirements of different investors. Small-ticket projects are increasingly overlooked in the urgent search for scale, but they also need to be nurtured. Furthermore, there is a lack of mandatory regulation to shift banks towards concrete commitments, despite national commitments to the Paris Agreement. There is also a lack of local currency financing and a limited availability of bankable projects.

MDBs and DFIs play a powerful role in mobilizing concessional and catalytic investments to leverage private investors. They act as anchor investors to de-risk pioneering projects and increase their bankability to investors. They also encourage and support policy change and mobilize additional private finance alongside their own investments. Furthermore, they support private credit institutions by investing equity to help financial institutions expand their lending. There is a need to increase MDB and DFI concessionality and expand risk-taking. The role and importance of MDB Capital Adequacy Frameworks reforms to increase lending capacity, while preserving long-term financial sustainability must not be overlooked.

Recommendations for private finance include the following:

1. Establish progressively ambitious net zero pledges and set out interim transition plans to reach net zero
2. Engage in partnerships with policymakers and regulations, not just transactions
3. Invest in building the capacity of staff and systems
4. Project developers and financial institutions must meet regularly to co-create investment projects and provide clarity on suitable sources and terms of financing
5. Encourage real economy borrowers and clients to implement the net zero transition
6. Ten principles for action to bridge the sustainable finance gap in Asia and the Pacific

Governments and regulators

- New climate finance partnerships between governments, regulators, MDBs, and private finance will guide action
- Effective NDC financing strategies are developed, led by authorities with clear mandates, which signal credible transition pathways with interim targets and clear resource mobilization plans
- Policy coherence and capacities are to be developed across key government ministries such as finance, energy, transport, and environment to reduce the costs of financing
- Decisive regulatory action can shift capital in Asia and Pacific towards the net zero transition
- Investment in the capacities of financial personnel is essential
- Investment in much-needed sectoral and project-based financial data strengthens solutions

Private finance—Asia–Pacific investors

- Commit to net zero pledges for 2050 with credible transition pathways including 2030 goals
- Increase local currency participation in energy transition projects, as well as green technologies and other net zero investments
- Support expansion and acceleration in the provision of concessional financing and risk-sharing by multilateral development banks, bilateral development financial institutions, and public development banks to de-risk projects to be co-financed privately
- Intensively collaborate with partners in project preparation in more challenging markets, whether in the least developed countries (LDCs), Small Island Developing States (SIDS), or in new green technologies

ESCAP financing for development report no. 5 'Sustainable finance: bridging the gap in Asia and the Pacific'

The report discusses challenges, opportunities, and recommendations for policymakers, regulators, and private finance in the Asia–Pacific region to bridge the gap in sustainable finance. It aims to spur a robust and informed debate among ESCAP member states on key measures to move towards increased sustainable finance, and to bring greater clarity regarding the benefits and consequences of various policy, regulatory, and private finance choices.

Financial solutions to close the investment gap in the drinking water and sanitation infrastructure of Central Asia

***Speaker** I: Arman Ahunbaev, Head of the Center for Infrastructure and Industrial Research, EDB, Kazakhstan*

It is symbolic that the title of the forum is what it is. This is resonating with what the EDB is doing and our approach to climate change, water resources and so on. Climate4 change demonstrates itself through the issues that are present in the water sector. Water stress in the region of Central Asia will increase by almost three times. By 2028 the region will face a chronic water scarcity challenge owing to climate change, rapid development, and growing populations. Canals being built in Afghanistan will also have an effect. Amudarya and Sirdarya are two sources that have an impact on the supply in Central Asia. Water is the foundation for health, prosperity, and a good comfortable environment. Of water extracted across the world, 13 percent is used to meet utility and household needs and in Central Asia this figure is at 7 percent. Water and sanitation are at the top of the global agenda. Two billion people remain without access to water. In our studies we identified five key factors shaping the water and sanitation sector of Central Asia.

With the growing demand for water, the numbers show that the structure of water consumption is changing. Investment into the sector was insufficient and did not meet growth rates; the aging infrastructure for water discharge is aged with no maintenance or upgrades. In Central Asia we have almost ten million people without access to safe drinking water. In urban settlements the situation is better and 80 percent have access to water, but this does not mean access to safe drinking water. Those that have access also face issues of quality. In developing countries about 80 percent of household water goes untreated. The region has issues owing to inefficient management rather than the quality of the water itself. In this region we experience decentralization. Management was transferred to municipal property and market reforms were introduced. Residential blocks were privatized. In the long run, if we do not do anything the situation will only get worse. The demographic numbers suggest that urbanization is growing very rapidly as well. Growth rates in Central Asia are some of the highest and from 2030 the urban population would exceed the rural population. The financial solution that we see through literature reviews tells us that for water supply and water discharge it is government that plays an important role and more than 90 percent of funds are allocated from the state budget. The private sector has a role, but it is a limited one. However, there are steps that can be taken. Financial support from IFIs is always welcome, with tariff reforms. There are also non-sovereign loans—for example, the EBRD has a project in Shymkent. There are opportunities and tools available and it is quite reasonable to engage private capital if we provide a proper regulatory framework. Larger private players can come into play. There are national level issues and regional level issues. Furthermore, there are also technological solutions at the urban and rural level. We must take real collective action. IFIs in Central Asia could combine efforts to bring more investment into the region. There are a lot of initiatives that organizations offer. Everyone has their own agenda and their water programs but there is no integrated approach.

Scaling up private climate finance: drivers, impediments, and solutions

***Speaker**: Shu (Grace) Tian, Senior Economist, Economic Research and Development Impact Department, ADB*

Rapid expansion of sustainable bond market worldwide

Global sustainable debt finance saw rapid growth to USD 6.6 trillion by June 2024, which is a 5.5-fold expansion from USD 1.2 trillion in 2018. Capital markets play an increasingly important role, with the share of bonds to total sustainable debt finance rising to 68.0 percent in June 2024 from 45.7 percent in 2018. The sustainable bond market in developing Asia has been growing from USD 122.8 billion by the end of 2018 to USD 670.6 billion by June 2024 and it accounts for 14.9 percent of the global sustainable bond total. Despite rapid expansion, the sustainable bond market in the

region accounted for only 2.1 percent of its general bond market, much lower than the corresponding share of 7.1 percent in EU-20 countries.

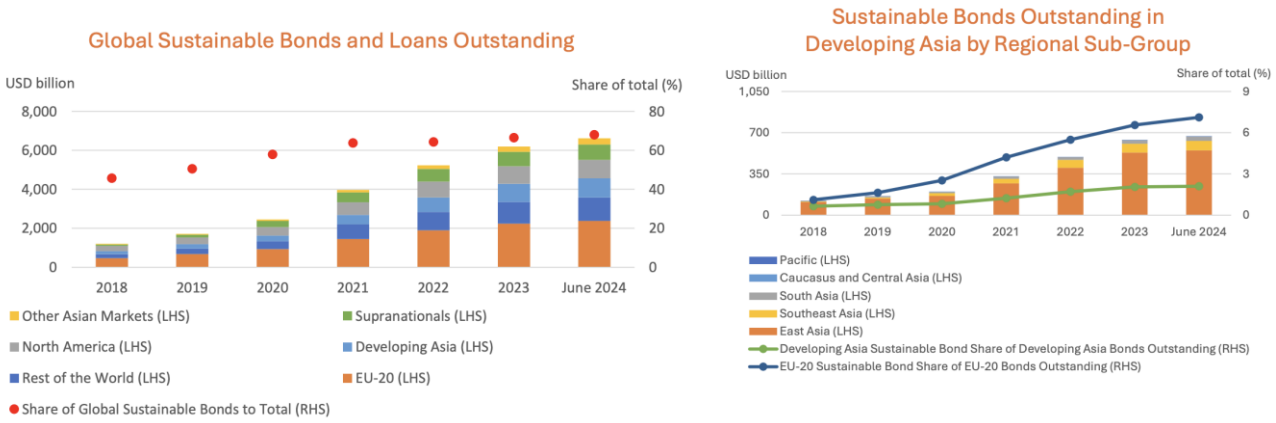


Figure 55: Trends in sustainable bonds in developing Asia by region, 2018-2024

Drivers of sustainable finance: Push and Pull factors

	Pull factors Leveraging (upside) opportunities	Push factors Managing (downside) risks
Financial Drivers	- Profitability - Capital market development - Public financial and policy incentives	- Climate-related physical, transition and litigation risks - Policy and regulatory initiatives
Non-financial drivers	- Ethical preferences ("Doing well by doing good") - Brand and reputation enhancement	- Public opinion, change in social norm - Corporate culture and engagement in key international initiatives - Key stakeholder demand

Source: ADB (2024)

Figure 56: Key drivers of sustainable finance: opportunities and risks

The sustainable bond market largely focuses on green finance. The sustainable bond market in developing Asia is dominated by green bonds, which make up 65.7 percent of the market.

*Developing Asia sustainable bond market are dominated by **green bonds** (65.7%).*

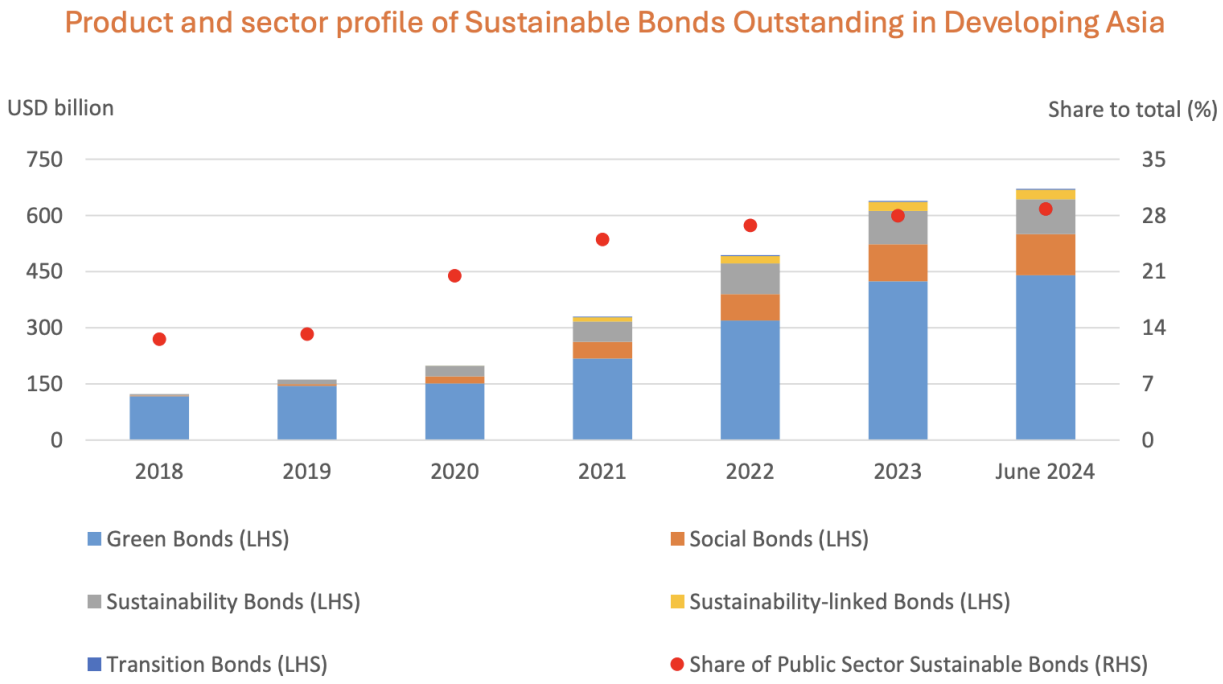


Figure 57: Sustainable bond market composition in developing Asia, 2018-2024

Carbon assets are facing negative investor recognition

Transition risk and climate awareness are driving investors away from carbon assets towards green assets. After the Paris Agreement, US banks reduced their proportion of lending to industries most exposed to transition risk. Additionally, banks that have signed the Net Zero Banking Alliance have significantly reduced their exposures compared to non-signatories by cutting lending to the riskiest industries (Jung et al, 2024). A global perception-based survey of 439 institutional investors finds that most survey respondents describe climate risks as being consequential to their asset holdings and firm returns (Krueger et al, 2020). Assets of funds with an environmental, social, and governance (ESG) mandate have grown by 170 percent since 2015 (ECB, 2020). Climate awareness has prompted investors to invest in more ESG-focused mutual funds and away from carbon-intensive ones (Marshall et al, 2021). Inflows into these funds are 47 percent larger in climate disaster months than in other months, and the difference between green and non-green fund inflows increases by 40 percent in climate disaster months (owing to salience effect). A one standard deviation increase in awareness about climate change is associated with 0.81 percent more carbon divestment by institutional investors in 23 countries around the world after 2015 (Choi et al, 2021).

Investors are willing to pay extra or accept lower yields in exchange for green impacts

There is an average 'greenium' of -1 to -9 basis points on secondary markets for both corporate and municipal bonds (MacAskill et al, 2021). Investors in the European equity market tend to accept lower returns, *ceteris paribus*, to hold greener and more transparent assets when the shift of the economy towards low carbon becomes more credible (for example, after the Paris Agreement, the first Global Climate Strike, and announcement of the EU Green Deal) (Alessi et al, 2021).

Carbon assets are facing a higher risk premium (that is, higher costs of capital) and financing constraints

Investors command a 'carbon risk premium' on US equities and globally on stocks with higher levels and growth rates of carbon emissions based on 14,400 firms across 77 countries (Bolton and Kacperczyk, 2021, 2023). A one-standard-deviation increase in cross-sectional scope 1 emissions is associated with a 1.1 percent increase in annualized stock returns (Bolton and Kacperczyk, 2023). Big carbon-emitting European companies have been paying higher interest rates on their bond issuances with a 40 basis point borrowing cost difference between high vs low-emitting firms since 2020 (De Nederlandsche Bank, 2024). Furthermore, there is a loan risk premium related to CO_2 emission intensity in syndicated loans after the Paris Agreement (BIS, 2021) and there is a carbon risk premium since 2016 of about three to four basis points (that is, a 0.03 percent to 0.04 percent loan rate premium). The premium for those with very high emissions (90th percentile in the sample), increases to seven basis points. Highly polluting firms command higher average returns as they are more exposed to environmental regulation risk (Hsu et al, 2023). A long-short portfolio constructed from firms with high versus low emission intensity within an industry generates an average annualized excess return of 4.42 percent, which remains significant after controlling risk factors. Carbon risks are also reflected in out-of-the-money option prices (Ilhan et al, 2021); the cost of option protection against downside tail risks is larger for firms in the S&P 500 with more carbon-intense business models. A one-standard-deviation increase in a firm's log industry carbon intensity increases the implied volatility slope, which captures protection against downside tail risk, by 10 percent of the variable's standard deviation. For carbon-intense firms, the cost of protection against downside tail risk is magnified at times when the public's attention to climate change spikes, and it decreased after the election of climate change skeptic President Trump.

Transition finance is essential during the net zero transition

Transition finance helps address asset stranding and carbon lock-in—two risk factors related to carbon assets (OECD, 2023). Asset stranding occurs when assets suffer from unanticipated or premature write-downs, devaluation, or conversion to liability (Lloyd's, 2017). Stranded assets are risks for asset owners but may also pose systemic risks and threaten financial stability. Some large energy public listed companies may face stranded assets of more than 80 percent of their equity (von Dulong, 2023). 'Global stranded assets as present value of future lost profits in the upstream oil and gas sector exceed USD 1 trillion under plausible changes in expectations about the effects of climate policy' (Semieniuk et al, 2022). Most of the market risk falls on private investors, overwhelmingly in OECD countries, including substantial exposure through pension funds and financial markets (see Figure 55) (Semieniuk et al, 2022). Carbon lock-in occurs when fossil fuel assets (existing or new) continue to be used, despite the possibility of substituting them with low-emission alternatives, delaying the transition to near-zero.

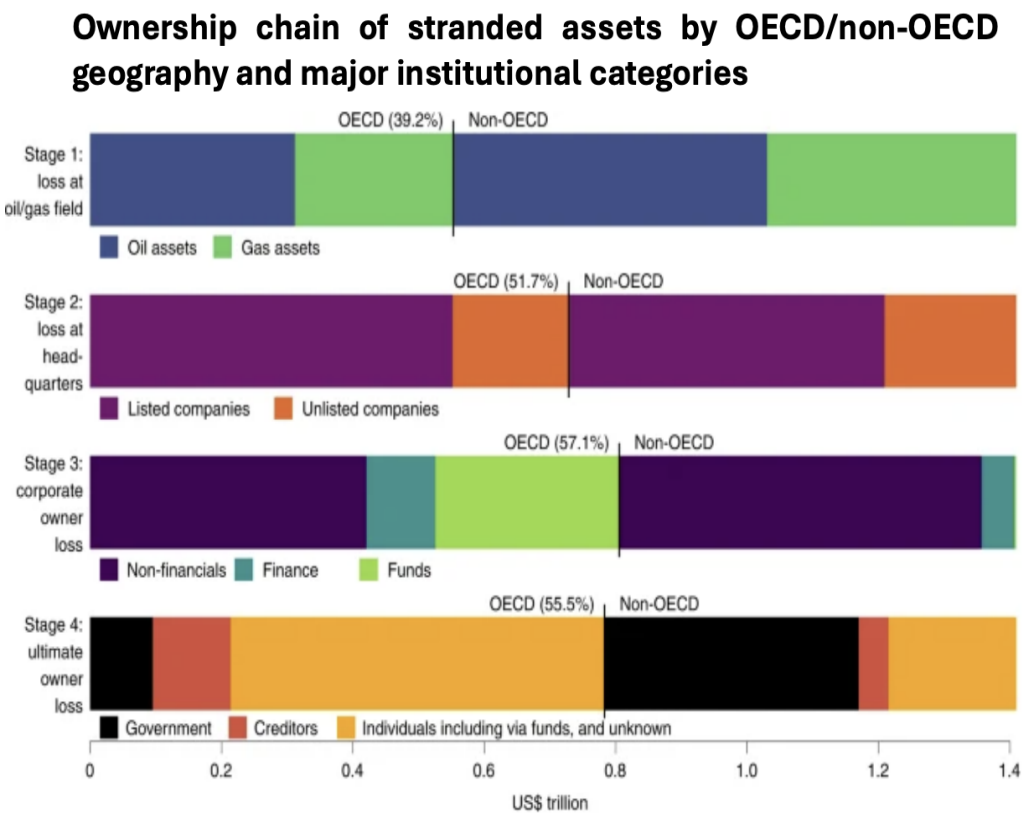


Figure 58: Stranded asset losses: OECD vs. Non-OECD distribution by ownership stage:

Each bar in Figure 58 represents USD 1.4 trillion in losses from medium expectations realignment at successive ownership stages, divided into OECD and non-OECD losses, and within each geography into major institutional categories.

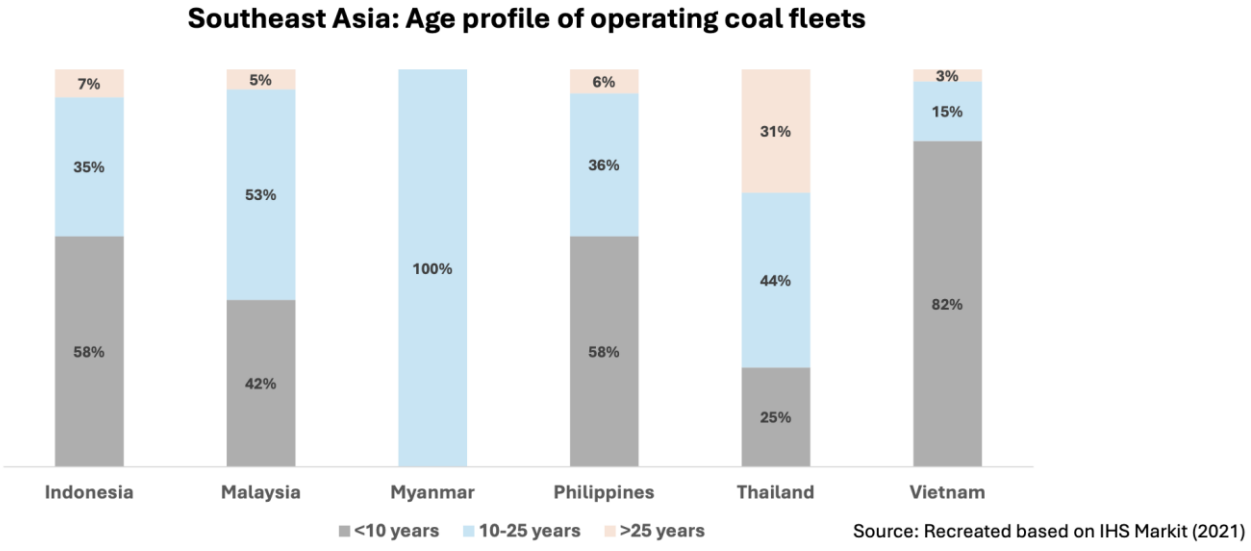


Figure 59: Coal fleet age profiles by country in Southeast Asia, 2021

Transition finance will help address carbon lock-in and phase out fossil fuel plants

Figure 59 illustrates how Southeast Asia is still excessively reliant on coal, with relatively younger coal operating fleets which need to be phased out. Vietnam has the highest share of young coal operating fleets among large power markets in Southeast Asia, making up 82 percent of total coal

capacity, followed by Indonesia and Malaysia (S&P Global, 2021). Therefore, it is a necessity to develop funding mechanisms to phase out coal while scaling up renewables in the region.

Bond instruments for transition are yet to take off

ICMA (2024) identifies three different overlapping definitions in general use currently for bonds that support transition. Transition-themed green and sustainability bonds: use-of-proceeds bonds to finance projects that will make a meaningful contribution to an issuer's GHG emissions reduction strategy. Bonds facilitating hard-to-abate transition finance represent only 2 percent of the total outstanding for green and sustainability bonds. Of the total USD 71 billion issuance of hard-to-abate transition finance, 44 percent comes from the fossil fuel industry. Labelled 'climate transition' bonds: these refer to green or sustainability bonds marketed with an additional climate-transition label. Japan is at the forefront of developing labelled transition bonds both in the corporate and sovereign sector. Transition bonds represent less than 0.4 percent of the outstanding sustainable bond market. Sustainability-Linked bonds (SLB): contrary to use-of-proceeds bonds, SLBs are focused on issuer-level sustainability targets benchmarked by key performance indicators (KPIs). SLB issuance from hard-to-abate and fossil fuel sector issuers reached USD 48 billion, representing 20 percent of the total SLB market of which 12 percent was for companies from hard-to-abate sectors and 8 percent for fossil fuel companies. Transition-linked bonds are sustainability-linked bonds, where one or more of the KPIs are monitoring GHG emissions reduction metrics.

Transition related bonds in global markets are steadily gaining interest, rising to USD 320.1 billion by June 2024 from USD 19.4 billion in 2020. This represents a 16.5-fold expansion, compared to the 5.5-fold expansion in global sustainable bonds outstanding. However, the share of transition-related bonds remains paltry at 4.8 percent of global sustainable bonds outstanding in June.

Transition-related sustainable bonds: some facts

Transition-related bonds outstanding in Developing Asia are only 4 percent of total sustainable bond markets versus 8 percent in the EU-20. The size-weighted average tenor of Developing Asia's transition bonds is much lower at 3.3 years compared with EU-20's 6.1 years, similar to Developing Asia's sustainable bonds average tenor of 3.9 years. Developing Asia and EU-20's transition bonds are mostly in local currency, with the LCY share at 75.3 versus EU-20's 86.0 percent, respectively. This is higher than Developing Asia's 69.8 percent LCY financing in sustainable bond markets. Transition-related bonds in both Developing Asia and EU-20 have been issued only by the private sector, suggesting space for governments to help promote this type of bond.

It is difficult for companies in fossil fuel and hard to abate industries to raise transition finance because of lack of consensus on acceptable and credible technologies and trajectories, and 'greenwashing' fears for issuers and investors alike.

Impediments to mobilizing transition finance

According to EY (2024) there is a lack of credible and interoperable transition taxonomies. They serve as a guide to investors and financiers who seek to channel capital into activities which support transition. There is also a lack of transition planning by financial institutions. Regulators have a role in facilitating sound transition planning and can propose supervisory guidelines for banks, insurers, and asset managers. There is also a lack of economic viability of coal phase-out projects and the early retirement of coal plants means a loss of revenue for plant owners and their financiers. Furthermore, a lack of demonstration projects show that successful decarbonization is achievable in most high-emitting sectors. Concrete examples are needed to counter the perception of high costs and risks and these could include transition projects in coal-fired power generation, steel, cement, and petrochemicals.

Financial sector regulation to support climate finance

Monetary and banking regulations to integrate climate risks

- Requiring climate integration in lending and investment
- Climate stress tests
- Climate considerations for collateral

Sustainable financial market development for a climate-oriented market ecosystem

- Green and transition taxonomies and roadmaps
- Sovereign issuance of sustainable bonds
- Sustainable bond standards and principles
- Capacity building for external sustainable bond verification, certification, and rating

Climate standards and disclosure to enable transparency and integrity

- Reporting standards (TCFD, ISSB)
- Measures to support market integrity for climate investments

Policy coordination for improved sequencing

- Enhance market efficiency by matching supply-side (issuer) sustainable finance standards with demand side-side (investor) expectations
- Corporate climate disclosure requirements paired with investor stewardship codes and fund climate reporting to build end-user demand for such data
- Green and transition finance taxonomy implementation paired with national green bond and sustainable financial product standards to match high-quality supply with demand

Source: Mortimer and Tian (2024)

Role of global initiatives and multilateral organizations

Strong cooperation on a voluntary basis at global level among different segments of private players is needed to mobilize climate finance. Some examples of such cooperation on a global level are:

- Glasgow Financial Alliance for Net Zero (GFANZ)
- Net Zero Banking Alliance (NZBA)
- Network of Central Banks and Financial Supervisors for Greening the Financial System (NGFS)
- Principles for Responsible Investment (PRI)

Multilateral development banks (MDBs) can blend in private sector finance by de-risking and improving the risk-return profile for the private sector to invest in climate transition, particularly in emerging economies. MDBs offer more than just financing; they also provide technical assistance at the project design stage to increase the pipeline of investable transition projects and facilitate the development of sustainable financial markets and an enabling climate finance ecosystem in emerging markets.

Financial innovation: startups and financing green technologies in the CAREC region

***Speaker**: Ms Xiaojing Fei, Co-host of Impact Hub Asia–Pacific*

Impact Hub has been a catalyst for entrepreneurial action since 2005. It is a locally rooted, globally connected network of 56,000+ members and program participants driving societal change in 120 locations across 70 countries.

Impact Hub's mission is to build locally rooted and globally connected entrepreneurial communities for impact at scale by growing impact enterprises that pioneer and scale solutions. Furthermore,

Impact Hub is focused on establishing large-scale cross-sector collaborations to mainstream these solutions and the systems change they promote. Impact Hub's APAC cluster 2023 consists of 14 impact hubs, one community partner, 13 countries and regions, and one candidate.

Startup maturity stages

1. Prototyping—this stage includes startups that have built an initial prototype of their product/service and are currently testing it with potential clients. However, they have not yet generated any sales.
2. Early operational—this stage includes startups that have generated some sales and gained market traction with their product/service but are not yet profitable.
3. Operational—this stage includes startups that have generated stable or increasing profits over a longer period of time.
4. Mature—this stage includes startups that are looking to expand their current operational base/market reach or want to establish one or more new branches locally or internationally.

30/60 goals and opportunities for climate innovation

With the 30/60 decarbonization goals, there is new momentum for innovation in the technologies needed for a zero carbon transition. According to IEA, if the world is to achieve net zero emissions by 2050, further rapid deployment of currently available technologies and widespread use of technologies that are not currently on the market will be required. Under this pathway, most global CO_2 reductions in 2030 would be achieved through technologies available today. However, by 2050, almost half of the carbon reductions will be achieved through technologies that are currently in demonstration or prototype phases. At the same time, achieving carbon neutrality will require technological innovation in many other industries, in addition to power and energy. In these areas, entrepreneurs will be provided with once-in-a-lifetime opportunities.

With a decade of funding nearly USD 50 million across 130+ climate tech companies, Elemental has discovered a major funding and expertise gap begins at TRL 9, or what we call Commercial Inflection Point 4. This is when the really difficult work begins: deploying technology with customers in the real world. With climate technologies in particular, the path to scale often requires significant capital, involves numerous strategic and community partners, and calls for thoughtful, complex, and iterative deployments.

From Figure 60, we can see that there are many financial tools but they hardly support green startups.

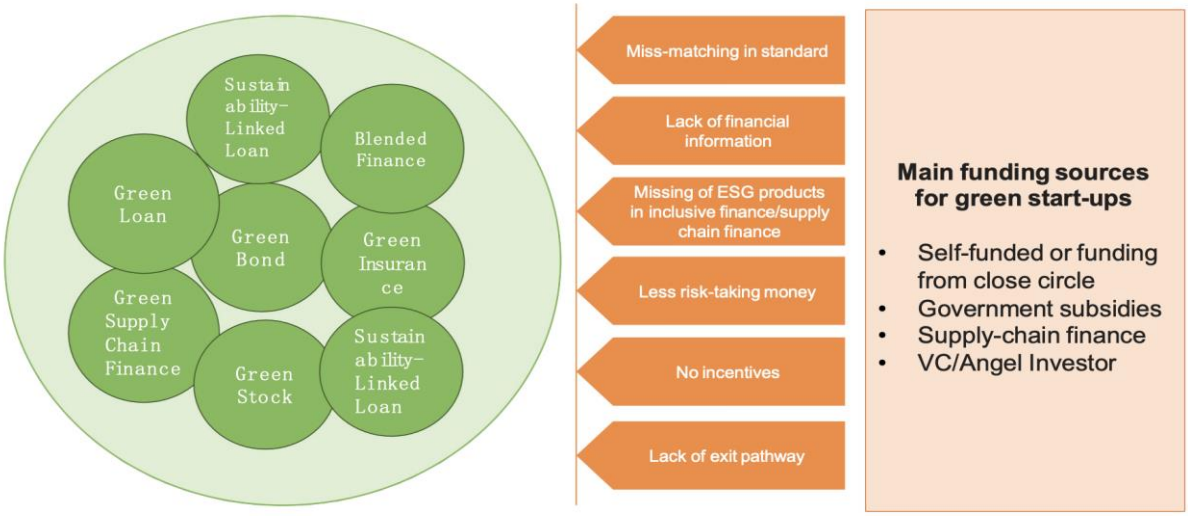


Figure 60: Funding sources and obstacles for green startups

Possible policy tools to increase accessibility

Direct investment from public sector

- Sustainable loans/bonds
- Grants/guarantees

Leverage private capital

- Guidance fund by government
- Public financing guarantee
- Monetary policy incentives

Provide fiscal and tax incentives

- Subsidies
- Tax reductions
- Lower rates

Capacity building

- Financial/non-financial information disclosure

Venture philanthropy as a leverage in climate innovation investment

Climate technology companies had to deploy their first pilot projects through expensive equity capital, and most investors who invest in growth stages need multiple commercial proof points from startups before they will get down to injecting capital.

In China, LPs with government backgrounds are even more risk-sensitive and cannot invest in early-stage startups.

Philanthropic funding can support early-stage climate innovation from a systemic and long-term perspective to reduce the cost and difficulty of financing, thereby accelerating the advancement of key stages of breakthrough.

Prometheus methodology: energy-inclusive finance to create a positive economic and social cycle

1. Energy supply is a fundamental enabler of revenue generation: for example, in the agricultural production unit, power and agricultural equipment can enhance agricultural production efficiency, and improve crop yield and quality; power + industry can enable the local provision of basic manufacturing capacity; in the micro-industrial and commercial unit, power + commercial equipment can enable micro-industry to realize more efficient production, so that micro-industry can provide a variety of paid services, lighting and cooling equipment can increase the efficiency of industrial and commercial work in a timely manner.
2. Economic growth can lead to additional positive externalities: economic growth can lead to improved labor literacy and greater gender equality, and as incomes and productivity grow, levels of education and healthcare will also rise significantly.
3. Access to clean energy by micro and small production units in the target markets lacks only the first initial investment: once the first initial capital is available, micro and small production units can begin to apply clean energy, thereby raising income levels and driving economic growth.

Prometheus will therefore focus on providing small and micro production units (agricultural, commercial, and industrial) in underdeveloped regions with initial funding for the procurement of their adapted clean energy products, which will serve as a pivot point for a series of changes that will lead to sustainable economic and social growth.

In order to realize our purpose, Impact Hub pursues impact-making through two pathways of activity: entrepreneurial support and collaboration, through two thematic lenses: climate action and DEI. The

impact pathways meet where impact enterprises are scaling tangible impact and where collaborative efforts are shifting systems—together contributing to the transition to a regenerative impact economy.

Focus areas

1. Removing barriers to entry to impact-driven entrepreneurship
2. Building a pipeline of social and environmental innovations
3. Serving as a platform to replicate and scale successful innovations trans-locally across 65 countries
4. Accelerating cross-sector collaboration with an entrepreneurial approach

Inclusive support

Impact enterprises are key drivers of social innovation and a thriving impact economy depends on their growth and impact. At Impact Hub we help underserved entrepreneurs start, grow, and scale organizations that pioneer solutions toward a just and sustainable society and create inclusive jobs. Most organizations that Impact Hub serves are impact-driven startups and micro-enterprises. Organizations can be both for-profit enterprises as well as non-profits. Increasingly Impact Hubs also work with SMEs, helping them transition to more sustainable operations and business models.

Results

- 315 new ventures founded per year
- 49 percent of professional success attributed to Impact Hub
- 52.6 percent of ventures are woman-led
- 75 percent of founders supported are under 35

Deployment of climate innovation often requires larger-scale investments, longer time periods and more customers. There are funding gap strategies, particularly in China. Globally around 40 percent of investments are in the seed and angel stage but in China, this is only at 9 percent. Based on our work in China we noticed that different players often have different kinds of support. In the early stage, the government provides a lot of support. Financial institutions often offer support in the later stage. While China has all kinds of tools and instruments to support the transition for green startups it is very difficult to obtain support based on our investigation of 3,000 startups in China. There is a mismatching of instruments for startups and sometimes they may not be listed companies so there is a lack of information on them.

Open Discussion

Altaf Hashim (AKDN, Kyrgyz Republic)—The decision to focus on the climate challenge is very timely. A lot of the commitments of 2050 and 2060 are discussions that need to be brought forward. The presentation on water is important for many reasons. In the context of Kyrgyzstan, urban poverty is at the same levels as rural poverty. We are trying to make climate-related investments so that people do not leave rural areas. My humble suggestion is that we refocus our attention on rural areas. My question is, water today in Central Asia is core to the region's stability and prosperity. What is the role of rural areas? AKDN sees it as a core interest. Could you speak a little about this, please?

Dr Indira (Bishkek)—Talking about investment, I would like to ask if Kazakhstan has any experience attracting investors on the following conditions. There are investors involved in mining, which is a big producer of climate-related impacts. Are there any cases, for example, where we accept the investments for mining, but you follow the standards to preserve nature and minimize damages? We will lower taxes and other state fees to make your activity beneficial. If you have experience, please share as this will help us attract investors to Central Asia.

Chinese Academy of Political Science—Relevant countries should be aware of possible risks. First, many actions related to climate change require governments to take responsibility. For governments in Asia and the CAREC region, fiscal resources and capacity are very limited.

Dr Asif Razzaq (CAREC Institute)—Green bonds. Since the readiness of the capital markets and financial market is not on the lower side specifically in Central Asia, what would the alternative tools be in such markets that are not very developed?

Dr Abid Suleri (SDPI)—Investors' appetite for ESG funding amid the acquisition of greenwashing. The latest numbers show that in 2020 most of those assets were parked in green financing, but now we know that these net zero pledges have no correlation with the increase in share prices of those companies. How do you see the future of investment in ESGs?

Mr Arman—In my understanding, the question was more on the Kyrgyz Republic. We observe this high rapid rate of urbanization and it is chaotic. You underscored that this happens as a result of internal migration because of unsatisfactory economic development in rural areas. Taking the Kyrgyz Republic, they have external migration to Russia and so on, the rural populations trying to escape harsh living conditions. What is to be done? This is an issue of socioeconomic policies and this cannot be addressed with one-off solutions or programs. These are more general problems that require broad solutions and are related to countries' development problems. This is my personal opinion. We must assess the economic policy of a country to address this. Through my indirect answers, you may understand why this is the case, but we must raise these issues so that something is done about it. We see the centralization of authority in the water sector in the Kyrgyz Republic because they had lost power in the last 30 years, and we hope to see this in other areas as well. There are some sectors where government must be there; water is one such sector. To ignore or disregard the sector is wrong. This happened in Central Asian countries, but it is changing now. One can talk a lot about this—it is a challenging question.

ESG Finance—Financing ESG to make more responsible the parties for the impact and influence on the environment there are just off the top of my head I think IFIs and my bank are actively introducing ESG principles. We are introducing these principles of ESG into our operations. These affect the quality of our portfolio, and we monitor where we spend our money using this criteria. Investors approaching it make commitments to meet ESG requirements.

Ms Suba—Over two thirds of Asia's economies are already at risk of debt distress or approaching debt distress. One thing to understand is that the amount of additional financing needed does not have to come at the expense of more government borrowing. We should look at how existing expenditure can be formulated to go into these sectors. It does not have to come at the expense of more government borrowing. ESG and greenwashing is a big debate in the United States and Asia–Pacific. One thing to understand about ESG is that they may not necessarily be investing in climate-friendly activities. ESG is predominantly a risk management tool and not a guide to impact on climate. Genuine greenwashing is when companies or banks say they will reduce their carbon footprint, but they do not. If a company makes a net zero pledge, you should see your stock price fall. Investors do not think net zero pledges by companies are meaningful. There is now movement—for example, the net zero banking alliance—and to be a part of this, you must have pledges that mature by 2030, not 2050, and so on.

Conrad (EDB)—For Ms Grace. When talking about transition finance, the key point is how financial institutions will transition, and the modernization of existing plants. When looking at MDBs, we need to analyze. Some banks are not even willing to finance the transition of brownfield projects. We understand this is extremely important to allow these sectors to transition into the region.

Grace—I fully agree with your views. There are some misconceptions about greenwashing. Guidelines for financial institutions need to be clearer. All these things should be considered. From the perspective of regulators, they should consider transitions as part of their plans. Our donors clearly point out that this fund should support only green initiatives; this is very primitive. Transition needs should be addressed.

SESSION VIII: CAREC THINK TANK VOICES

Think tanks operate in complex political and business contexts with profound financial sustainability and growth implications. This panel discussion would delve into the specific challenges that think tanks face within political and business contexts, including navigating regulatory hurdles, managing stakeholder interests, and preserving independence while engaging with political and corporate entities. Moreover, the panel would explore various strategies that think tanks employ to achieve financial sustainability and innovative approaches to foster institutional growth. The panel comprising CAREC think tank representatives would share their insights and experiences relevant to the topic (40 minutes). The CTTN secretariat will present the progress report (10 minutes) and receive CTTN member feedback to improve the network (20 minutes).

***Moderator**: Dr Kuat Akizhanov, Deputy Director II, CAREC Institute*

Panel discussion on navigating political and business landscape: achieving financial sustainability and fostering institutional growth

***Panelist I**: Suat Beylur, Director, Eurasian Research Institute, Kazakhstan*

There are more than 10,000 think tanks worldwide. Regarding the distribution of think tanks by field, we see trade, economics, and finance come in at first place with about 22 percent of all think tanks. Think tanks dealing with climate issues are also substantial. The question is about their effectiveness. The number of think tanks in the CAREC region is 1,000 to 2,000. If we consider

China and Pakistan, there should be many think tanks, but unfortunately no date for their distribution. The number of think tanks in Kazakhstan is about 30; some are affiliated with the government, others with universities, and others are independent or linked with NGOs.

Major think tanks in Kazakhstan

1. Kazakhstan Institute for Strategic Studies (KazISS)
2. Foreign Policy Research Institute (MFA)
3. Eurasian Research Institute (ERI)—Khoja Akhmet, Yassawi University, Kazakhstan
4. Economic Research Institute
5. Institute of World Economics and Politics (IWEP)
6. Kazakhstan Institute of Management, Economics, and Strategic Research (KIMEP University)
7. Center for Strategic and Military Research
8. Institute of Ionesphere II
9. Institute of Geography and Water Security (INGEO)
10. Institute of Hydrobiology and Ecology (IHE)
11. Central Asian Institute of Environmental Research (CAIER)
12. Public Policy Research Center (PPRC)
13. Public Research Institute—opinions.kz
14. Public–Private Partnership Center
15. National Analytical Center
16. Eurasian Integration Institute (EII)
17. Center for Applied Research (TALAP)
18. PaperLAB Research Center
19. Kazakhstan Institute for Strategic Studies (KISS)
20. Sustainable Kazakhstan Research Institute—Narhoz University
21. Center for Natural Resources and Sustainability—Kazakh–German University
22. Climate Change Coordination Center (CCCC)
23. Center for Research and Consulting (CRC)

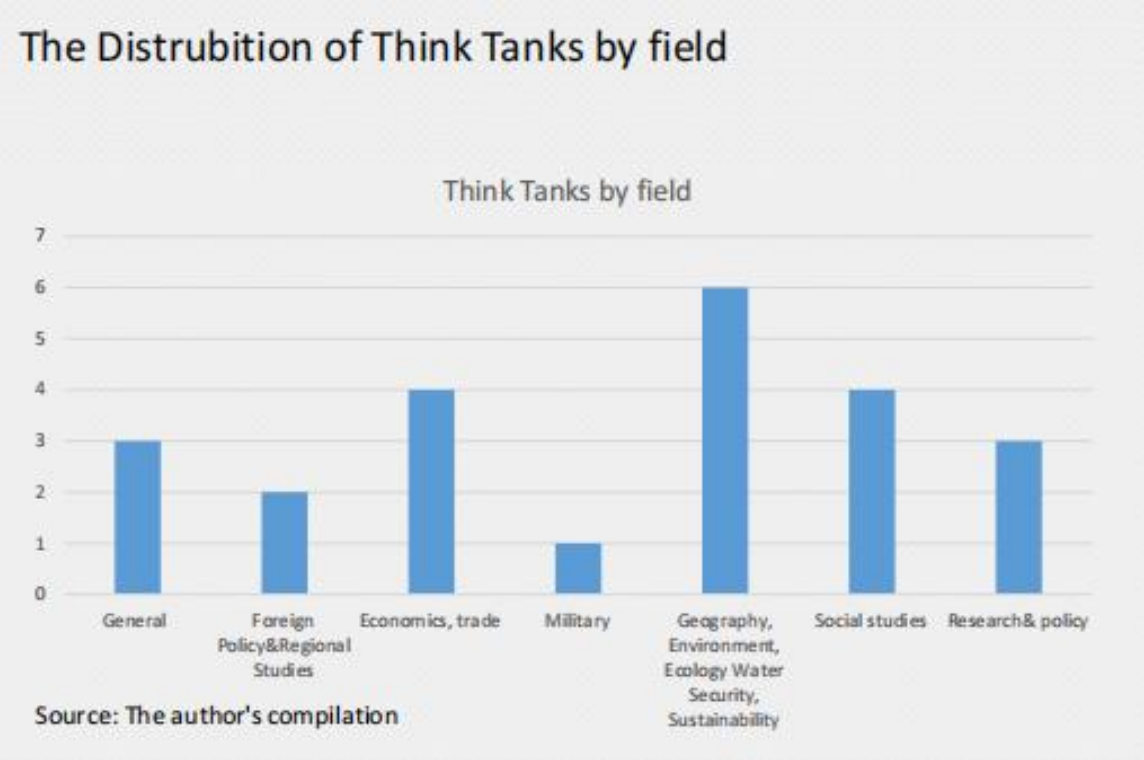


Figure 61: Think tank focus areas by field

There are about six think tanks dealing specifically with climate issues. There is a historical reason behind this from the Soviet period; there was a nuclear testing area in Kazakhstan. This had a lot of negative consequences and, after the dissolution of the Soviet Union, many NGOs and think tanks were created to deal with the negative consequences.

The financial resources of think tanks in Kazakhstan:
1. Government
2. International organizations
3. International foundations and institutions

What more can be done for collective action?
From the reports of the global Go to Index on think tanks (TTT report, CAREC, and other organizations), it is evident that a significant number of think tanks are operating on environmental and climate change issues at both global and national levels.

However, the extent to which these think tanks influence policymaking processes remains a subject that requires further investigation.

At this point, I believe we should focus on the following issues:

The first issue, in my opinion, is the financial sustainability of the relevant think tank organizations. Naturally, if these organizations do not have sufficient and sustainable financial resources, their output and impact will be limited.

The second issue is the need for a continuous, yet distanced and sustainable relationship between the relevant think tanks and government institutions. Otherwise, the knowledge produced cannot be expected to be considered by governments. In this dialog, official intergovernmental structures like CAREC play important roles.

Another point is the necessity of experience sharing and collaboration with non-regional think tanks that have significant experience in this field globally. I believe that CAREC has the necessary infrastructure and resources to facilitate this.

Panelist II: *Abid Suleri, Executive Director/Advisory Council Committee Member of COP29, Sustainable Development Policy Institute, Pakistan*

Panelist III: *Mr. Shahin Sadiqov, Director, Economic Scientific Research Institute, Azerbaijan*

This topic is very modern and very important for the future of our think tanks, but the stabilization of financing and the implementation of projects in our countries—specifically those on climate—is becoming more and more relevant. As time passes, in Azerbaijan we have been focusing on this for a long time, but this theme still has a certain lag so there is some delay in embedding the green consciousness in people's minds. However, people do feel we need to be more environmentally mindful. We cannot do this alone; we must communicate and collaborate to achieve different results and fulfil our common tasks. We have bilateral and multilateral agreements. The issue of the green economy plays an important role. Think tanks will facilitate institutionalization nationally and on the basis of international contracts. Institutional financing is key. Government, corporate, and the private sector can provide funding. The economic and financial capacities of countries in Central Asia vary greatly. We need to evaluate the financing capacities of all the countries, both from the government budget perspective and the viewpoint of corporate structures in these countries. The funds obtained from donor banks and other states must be invested through the government budget mechanism and budget classification is key. They must differentiate and tag their efforts for climate change. We need more regional assessments and a framework strategy—an intergovernmental strategy that would serve as a basis for programs in all the countries. This process would facilitate sustainable funding. Why have I decided to think about it from a macro perspective? I think sustainable funding at this level is key for the financial sustainability of think tanks because, owing to volatility, it is impossible without. Strong think tanks play a key role in shaping public policy and impacting decision-making. In CAREC countries we have certain geopolitical risks and tensions as well as changing

standards in government; therefore, in order to be resilient think tanks need to be more sustainable, which is essential to fulfilling our mission. It is a known fact that financial sustainability is needed for everything worldwide. To address this, various funding modes need to be applied and diversification must take place to give long-term think tank success. Good communication is needed and the implementation of innovative solutions along with the latest technology. National and international efforts are key for cooperation with other think tanks, academic institutions, and organizations. The development of talents is key—talent management, enhancement of research capacities, continuous education. This can be achieved in the concept of self-development.

The main milestones of Azerbaijan:
Five years ago, the president identified five key areas out of which one was green growth and a clean environment. By doing that, besides the other four pillars the government has focused on this pillar—specifically, renewable energy sources. At the beginning of this year, the president signed an action plan. This document includes six pillars and 58 main paragraphs for implementation this year. In early November, we are expecting international delegations and the signing of important documents. I would like to let you know that, on 1 December, our institute think tank is hosting the forum economy of new generation challenges and a celebration of 60 years of our institution.

***Panelist IV**: Mariam Lobjanidze, Acting Lead Economist, ISET Policy Institute, Georgia*

Think tanks have to work in very complex environments—significant political shifts in terms of the government adopting laws on foreign interference, which restricts funding from foreign institutions. After the adoption of the law, it was decided that it would hinder Georgia's accession to the European Union. The law hinders think tanks and their national sustainability. Some think tanks intend to stop their operations; most depend on foreign funding. After this law was implemented, many did not register. There is huge uncertainty and therefore financial instability. Their reputation has also been damaged because not only do institutions suffer but also employees; you cannot attract good talent. According to ISET, polarization in the country is increasing and even more after the adoption of this law. When it comes to this law, the government overrides the president. A lot is going on right now; to overcome this, think tanks are working with the donor community and the legal community to raise public awareness related to these issues and their implications. There is no unified strategy because there is a great deal of variation among them. Some may not have the resources; most think tanks are deciding not to register. In summary, I would like to say that the current situation in Georgia is very tense and detrimental to think tanks.

Moderator—We are talking about socioeconomic issues; it is all interconnected.

Question—When we talk about resilience, what about the transition to sustainable energy? In some countries, there are nuclear plants located in seismic zones. What threats are caused by this energy transition?

Question—What kind of reforms are taken in Kyrgyzstan for disaster risk management and reduction? It is very core to resolve the issue in place.

Question—Which direction are we going for? Strengthening the role of think tanks to promote development convergence? Or are we talking about the role of CAREC think tanks in the long-term realization and goals of the CAREC Program?

Suleri—Our strength is evidence and research, and we are agents of change. We can support our governments and partners in terms of acceptance and also tell them to ease off on the pain of the transition of reforms.

Mr Shahin—The process of institutionalization must be expedited; we need international institutionalization and new approaches. In the framework of CAREC, we must have new initiatives and efforts. The green economy is a public good. I think the main funding must come from

government financing. In terms of execution, depending on the task this funding could be given to the private sector.

Dr Indira—List four very important documents that talk about climate-related issues and two new state authorities which were not there before but have been added. The role of think tanks is growing in the country and the government welcomes new ideas and initiatives; in this system, they're being very cooperative and they are oriented towards tackling these issues.

Panelist V: *Dr Indira Satarkulova, Acting Director, OSCE Academy in Bishkek*

Climate change in Kyrgyzstan: recent developments and state policies
The current problem is very important to the Central Asian region. There are many think tanks in this region, but this presentation will focus on the issues in Kyrgyzstan because of climate change; it has caught the attention of research institutions along with recent occurrences and certain legal developments, as well as steps taken by the state and think tanks in Kyrgyzstan. Significant water resources and reserves are located between two mountain systems.

Current hazards include drought, land and mudslides, earthquakes, flash floods and glacier lake outburst floods. Major earthquakes happen between every five and ten years. The combination of earthquakes and other geographic factors means there are also other climate-related hazards. The frequency of these hazards causes a lot of economic damage.

The state and think tanks strongly advise that these areas are researched and paid attention to:

1. Temperature rise
2. Loss of mountain glaciers
3. Development of mining activities

The total area of forests in Kyrgyzstan is 4.3 percent but the area of spruce forests decreased by 3 times. Juniper forests have totally disappeared over the past 15 years. GHG emissions are caused by the energy sector.

Recent developments show that the government acknowledges the current problems, and they are trying to pay attention to these problems. Four main documents have been approved, and two additional state authorities have been established to tackle these problems. We can discuss this any time, but nature does not wait. In 2024, Kyrgyzstan faced the most significant flooding in recent history with large mudflows.

Issues in Kyrgyzstan's policy

1. Preventive authority: the government must appoint a concrete state authority responsible for the prevention of natural hazards
2. State financial support: the state must finance the construction of mechanisms to prevent natural hazards
3. Local adaptation plans: each region in Kyrgyzstan must develop specific plans to tackle climate challenges

Challenges in implementing state policies

- Funding gaps: lack of financial resources hampers effective climate action
- Limited awareness: local communities often lack education on climate issues
- Limited capacity: Kyrgyzstan lacks experts in the field

Moderator—Question to Dr Suleri. In your opinion, what is the input of think tanks in the region? If we take the cynical view that think tanks are operating in their own world, what is their role? In some cases, perhaps they are not needed.

Dr Suleri—Think tanks in CAREC are not uniform; their roles are varied. Trying to zoom in on the question, I would say we do have some success stories; think tanks are playing a tremendous role. I can argue that for most think tanks present in this room, you will find they are all highly rated in the University of Pennsylvania's index. This means that the think tanks here have access and a knowledge base that allows them to play an important role in shaping policies. When it comes to Pakistan and SDPI, which is 33 years old, I think if I look back at some of the success stories, we work with rather than for the government. We do not accept government funding or grants. This gives us enough leverage to remain part of the solution and highlight deficiencies in the government's plan. When it comes to relevance, a think tank is only relevant or influential if it is useful to society or the government; one must be multidisciplinary. Foundations are also key in their funding and so are international organizations. Our major source of funding is through our research. As part of the founding advisory council, I remember initially we spoke of forging this network and even in the eighth year we meet regularly. The research grant is important for collaboration. What I would like to propose is three more additional points.

Trying to come up with some consolidated positions—for example, in COP29 and at the UN General Assembly in September. Can we create a collective impact as a region? We can agree on some minimum denominators. There is a need to promote our participation in each other's events beyond this forum. We have the SDPI annual conference, and we would be happy to invite other think tanks and researchers to Pakistan so there is something beyond this meeting. We should encourage youngsters to participate in exchange programs between think tanks. For us, communication barriers are the main issue. Exchanges would enable the bridging of this gap.

Moderator—I wonder if there is an issue of differentiating between so-called state-run think tanks and research institutions that are more privately run. What are your thoughts on this Professor Shahin?

Open Discussion

- Fiscal crisis
- Fuel crisis
- Food crisis
- Fragility of climate change
- Frontiers (conflict)
- Functional governance model
- Fertility

CTTN PROGRESS AND INITIATIVES BY THE SECRETARIAT

CTTN progress report

***Speaker**: Hans Holzhacker, CAREC Institute*

About the network
Leading think tanks from the CAREC member countries agreed to establish the CAREC Think Tanks Network (CTTN) during the second CAREC Think Tank Development Forum (CTTDF) in Urumqi in 2017. The 'Urumqi Declaration' is the main founding document. CTTN promotes regional economic cooperation by knowledge sharing, fostering policy research and knowledge solutions to support governments, and reducing gaps between research and policy with over 60 think tanks, research institutions, universities, and policy centers from CAREC countries. Key activities: CAREC Think Tank Development Forum (CTTDF), Research Grants Program (RGP), Think Tank Dialog—CTTN Blog.

Activities

CAREC Think Tank Development Forum
The CAREC Think Tank Development Forum (CTTDF) is the flagship event of the CAREC Institute; it is organized annually under the auspices of the CTTN. Starting in 2016, the CTTDF has become an annual regional gathering of renowned think tanks, government officials, the private sector, development partners, and media to deliberate on pressing regional issues.

No.	Title	Country
1	Designing policy support for **climate-smart trade** in the CAREC region	PAK
2	Optimizing Financial Architecture by Overcoming Challenges to Implement **Emission Trading Mechanisms** in the CAREC Region	PAK
3	**Carbon pricing** in Central Asia: Opportunities and barriers: The case of the Kyrgyz Republic	KGZ
4	**Climate change** in Kazakhstan: **State Policy and Public Awareness**	KAZ
5	Innovative Perspectives: Exploring Opportunities in **Emissions Trading Systems** for CAREC Countries	GEO

Table 22: CTTN research grants program

Think Tank Talk Series/Dialog

The first CTTN dialog in 2024, titled 'Trade Diversification in the CAREC Region: Opportunities and Challenges,' was held in virtual mode on 9 August 2024. The event featured insights from regional think tanks, addressing the following areas:

- Analysis of trade flows in the CAREC region
- Identification of opportunities and challenges in trade diversification
- Exploration of innovative approaches to export diversification

Two more dialogs were planned for 2024.

Figure 62: CTTN blog reactivated in 2024

CTTN partnerships

CI has established memorandum of understanding (MoU) partnerships with 23 institutions, most recently signing new cooperation agreements with the Eurasian Fund for Stabilization and Development (EFSD), Beijing Technology and Business University (BTBU) and Beijing National Accounting Institute (BNAI), the Center for Analysis of Economic Reforms and Communication (CAERC) of Azerbaijan, the Export–Import Bank of China (CEXIM), Eurasian Development Bank (EDB), and OSCE Academy in Bishkek.

Going forward

- Continued networking with think tanks, institutions, and organizations under the CTTN
- Continued activities such as the forum, dialog, blog, and research grants
- Forming research alliances for specific topics, especially related to climate change, trade, and connectivity
- Insights and comments about CAREC's and CI's upcoming new strategies

Suggestions and feedback on CTTN

Khalid Umar—While conceiving this session, the objective was to listen to think tanks; we understand they are working in a very complex critical environment and wish to hear what their issues are. A lot of technology has been introduced. I just wanted to clarify the objective of the previous session.

Moderator—We should intensify think tank cooperation and it should be strongly project-based. Please do contact us.

Closing reflections and acknowledgements

By Dr Jingjing Huang, Deputy Director I, CAREC Institute

Dear guest speakers, panelists, and moderators,

Dear participants, ladies, and gentlemen,

Thank you for joining this eighth CAREC Think Tank Development Forum!

As the French writer Victor Hugo said, 'Nothing is more powerful than an idea whose time has come.' For a long time, think tanks have served the world as one of the most important forces to generate ideas for solutions to public problems. They are a form of collective intelligence where scholars, government officials, experts, and entrepreneurs sit together to discuss topics that are important to the social good. Today, more than 90 think tanks from the CAREC region are being listed in the Global Think Tanks Index Report ranking, reflecting the activeness and effectiveness of the think tanks for regional development. While most think tanks dedicate themselves to national issues, quite a few still focus on issues that may have regional impact.

The CAREC Institute's annual think tank development forum has been an important platform for regional think tanks to exchange views and insights, and to strengthen ties in regional knowledge cooperation. This year, the forum focuses on climate change, an issue which has evolved as an accelerated threat to human beings. During this one-and-a-half-day forum, we have had an opportunity to listen to many remarkable views and ideas. On the first day, Mr Johannes from the Brookings Institution elaborated on the challenges faced in the climate agenda and put forward a 'prescription' on how to respond to and overcome these challenges. My CI colleague Dr Hans stressed the need for technologies for climate change mitigation and adaptation and called for focused think tank cooperation. Mr Norbert from IMF assessed the pathways for sustainable development—to put it more concretely, how to achieve high economic growth while minimizing carbon emissions. This was followed by a session discussing subregional perspectives against climate change, in which Ms Marthe shared her insights on ASEAN; Mr Suriyan on GMS; Ms Altinay, Mr Roman, and my former colleagues from the CAREC Institute Dr Iskandar and Mr Khalid on CAREC.

The Research Grant Program has been one of the key components of the CAREC Institute's CTTN. Under the network, the program aims to support CTTN member think tanks to produce policy research on topics of regional significance so as to jointly work on regional issues. So far, the CAREC Institute has provided grants to the CTTN members for six consecutive years. In this forum, five grant winners—namely, Mr Giorgi, Mr Azimzhan, Ms Ummara, Ms Hadiqa, and Ms Aijan—were invited to present their studies, and we believe their findings have added value to the regional body of knowledge.

In the face of climate change issues, innovative technologies are urgently needed. In this section, we were fortunate to have Professor Tan; Mr Kumar; our regular resource person, Ms Dina; and one of my colleagues at CI, Dr Asif, share their views and solutions to develop a regional technological ecosystem against climate challenges.

To share best practice and learn from each other, this year's forum also included some country-specific case studies on local solutions for climate resilience. Here, we were glad to hear such country presentations from Azerbaijan, China, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan. Examples in these case studies are representative; some experiences and solutions are very valuable for other countries.

Adequate financing is critical to transform ideas into effective climate actions. In this session, we were pleased to have Ms Subathirai, Mr Arman, Ms Tian, and Ms Fei illuminate their views on financing gaps and solutions. Identifying the gap and knowing what to do are always the first and foremost steps for actual implementation.

With all these excellent presentations and fruitful discussions, I believe everyone present here must have learned something new. We value every smart idea and hope that these knowledge outcomes will be catalysts for policymaking and optimization.

Apart from the earlier academic presentations and discussions, this forum gave CAREC think tanks an opportunity to share their insights and experiences on financial sustainability and institutional growth. The views of panel representatives from the Eurasian Research Institute, Sustainable Development Policy Institute, Economic Scientific Research Institute, ISET Policy Institute, and OSCE Academy are highly valued, and lessons learned should be promoted.

Every year we end our think tank forum with a CTTN progress report. On the one hand, we bring you the latest updates on CTTN development; on the other hand, we collect ideas and suggestions to optimize our approaches. We really appreciate your input and will certainly take these ideas seriously and adjust our plans accordingly.

Partners are those we can rely on for greater success. Taking this opportunity, I would like to extend my sincerest gratitude to our partners for this forum. My special acknowledgement goes to ADB and the CAREC Program Secretariat, who have been giving multifaceted support to the CAREC Institute for years. With your constant reinforcement, I believe that the CAREC Institute—as well as our next think tank forums—will continue to flourish.

Before I close, let me once again congratulate all presenters, panelists, speakers, and colleagues who have contributed to this forum. I would also like to extend the greatest thanks to my CI colleagues from the strategic planning division for the professional organization of the forum, and colleagues from the administrative division for their strong assistance to the forum. Thank you, everyone, good luck and have a good day!


Date: 27-28 August, 2024
Location: Ritz-Carlton, Almaty, Kazakhstan
CAREC
th
The Climate Challenge
Thinking Beyond Borders for Collective Action

AGENDA FRAMEWORK

DAY 1		
Time	**Session/Moderator**	**Description**
8:30–9:00	Registration	Participants register for the event at the venue
Session I: Opening Ceremony		
9:00–9:30	Moderator: Kabir Jurazoda, Director, CAREC Institute	
	Welcome Remarks	Kabir Jurazoda, Director, CAREC Institute
	Opening Address	Yang Yingming, Vice President, ADB
	Keynote Address	Assel Sarsenbayeva, Chairman, Economic Research Institute
	Group Photograph	All participants
Session II: Context Setting		
9:30–10:40	Moderator: Lyaziza Sabyrova, Regional Head, Regional Cooperation and Integration, ADB	
	Topic 1: Assessing the Impact of Climate Initiatives	Speaker: Johannes F Linn, Brookings Institution
	Topic 2: Climate Change, Adaptation, and Mitigation Technologies	Speaker: Hans Holzhacker, Chief Economist, CAREC Institute
	Topic 3: Pathways to Sustainable Development	Speaker: Norbert Funke, Director, IMF CCAMTAC
	Open Discussion	The moderator invites questions, comments, and feedback from participants
10:40–11:00	Coffee Break	Coffee and refreshments in the foyer
Session III: Asia in the Global Fight Against Climate Change		
11:00–12:50	Moderator: Sergei Ulatov, Deputy Managing Director, EFSD	
	Topic 1: ASEAN's Path to Net Zero	Speaker: Marthe Hinojales, ASEAN+3 Macroeconomic Research Office
	Topic 2: GMS Synergies for Climate Resilient Development	Speaker: Suriyan Vichitlekarn, Mekong Institute
	Topic 3: CAREC Region's Climate Vulnerabilities	Speaker: Iskandar Abdullaev, IWMI

	Topic 4: Decarbonizing Global Value Chains in CAREC	Speaker: Altynay Arapova, ADB
	Topic 5: Critical Raw Materials in the CAREC Region	Speaker: Roman Vakulchuk, NUPI
	Topic 6: CAREC Climate Change Action Plan	Speaker: Khalid Umar, ADB
	Open Discussion	The moderator invites questions, comments, and feedback from participants
12:50–14:00	Lunch Break	Lunch is served in the ballroom.
Session IV: CTTN Research Grants Program (RGP) Presentations		
14:00–15:00	Moderator: Dr Siddarth Saxena, Chairperson, Cambridge Central Asia Forum	
	Topic 1: Exploring Emissions Trading Systems	Speaker: Giorgi Khishtovani, PMC Research Center
	Topic 2: Climate Change in Kazakhstan	Speaker: Azimzhan Khitakhunov, Eurasian Research Institute
	Topic 3: Optimizing Financial Architecture for Emissions Trading	Speaker: Ummara Razi, ILMA University
	Topic 4: Designing Climate-smart Trade Policies	Speaker: Hadiqa Tanveer, Bahria Business School
	Topic 5: Carbon Pricing in Central Asia	Speaker: Aijan Sharshenova, Crossroads Central Asia
	Open Discussion	The moderator invites questions, comments, and feedback from participants
Session V: Innovative Technologies for Climate Change Mitigation and Adaptation		
15:00–16:10	Moderator: Hans Holzhacker, Chief Economist, CAREC Institute	
	Topic 1: Bridging Technological Disparity	Speaker: Dr Xianchun Tan, CASISD
	Topic 2: Greening Economic Corridors and Trade	Speaker: Kumar Utsav, ADB Kazakhstan
	Topic 3: Green Hydrogen: Opportunities and Challenges	Speaker: Dina Azhgaliyeva, ADBI
	Topic 4: Developing Innovation Ecosystems	Speaker: Dr Asif Razzaq, CAREC Institute

	Open Discussion	The moderator invites questions, comments, and feedback from participants
16:10–16:30	Coffee Break	Coffee and refreshments in the foyer
Session VI: Local Solutions for Climate Resilience		
16:30–18:00	Moderator: Jang Ping Thia, Lead Economist, AIIB	
	Case Studies from Six CAREC Countries	Presenters from Azerbaijan, China, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan showcase country-specific solutions
	Open Discussion	The moderator invites questions, comments, and feedback from participants
19:00–20:30	Dinner	Dinner at Altitude Hall

DAY TWO		
Time	**Session**	**Details**
9:00–9:30	Registration	Participants register for the second day of the forum at the venue
Session VII: Fixing Climate Finance		
9:30–11:00	Moderator: Akiko Terada-Hagiwara, Principal Country Specialist, ADB	
	Topic 1: Bridging Sustainable Financing Gap	Speaker: Subathirai Sivakumaran, UNESCAP
	Topic 2: Financial Solutions for Drinking Water and Sanitation Infrastructure	Speaker: Arman Ahunbaev, EDB
	Topic 3: Scaling Up Private Climate Finance	Speaker: Shu Tian, ADB
	Topic 4: Financial Innovation for Green Technologies	Speaker: Xiaojing Fei, Impact Hub Asia-Pacific
	Open Discussion	The moderator invites questions, comments, and feedback from participants
11:00–11:20	Coffee Break	Coffee and refreshments in the foyer
Session VIII: CAREC Think Tank Voices		
11:20–12:30	Moderator: Kuat Akizhanov, Deputy Director II, CAREC Institute	
	Panel Discussion on Challenges and Opportunities for Think Tanks	Panelists: Suat Beylur (Kazakhstan), Abid Suleri (Pakistan), Shahin Sadiqov (Azerbaijan), Mariam Lobjanidze (Georgia), Indira Satarkulova (Kyrgyz Republic)
	Open Discussion	The moderator invites comments and feedback from participants
	CTTN Progress Report and Feedback Session	Speaker: Hans Holzhacker, CAREC Institute
12:30–13:10	Closing Reflections and Acknowledgements	Reflections by Dr. Jingjing Huang, Deputy Director, CAREC Institute
13:10–14:30	Lunch Break	Lunch is served in the ballroom

LIST OF PERSONS

1. Mr Karamat Ismayilov—Deputy to Chairman at the Center for Economic and Social Development (CESD)
2. Ms Vusala Jafarova—Chief Advisor at the Strategic Planning Division at the Center for Analysis of Economic Reforms and Communication
3. Mr Shahin Sadiqov—Director at the Economic Scientific Research Institute (ESRI), Ministry of Economy
4. Mr Li Ruisi—Institute of Russian Eastern European and Central Asian Studies at the Chinese Academy of Social Sciences
5. Mr Zhang Wei—Office of Policy Research at the Ministry of Finance
6. Mr Chen Shaoqiang—Researcher at the Chinese Academy of Fiscal Sciences
7. Ms Tamar Chkhubianishvili—Junior Researcher at the Georgian Foundation for Strategic and International Studies
8. Mariam Lobjanidze—Acting Lead Economist at the ISET Policy Institute
9. Dr Giorgi Khishtovani—Research Director at the PMC Research Center
10. Ms Ani Peradze—Chief Specialist at the Sustainable Development Promotion Division of Energy Efficiency and Renewable Energy Policy and Sustainable Development Department, Ministry of Economy and Sustainable Development
11. Ms Lidiya Parkhomchik—Chief Expert of the Eurasian Studies Program at the Institute of the World Economics and Politics (IWEP)
12. Ms Dolores Borisovna Tyulebekova—Science Advisor at the Economic Research Institute (ERI)
13. Gulnaz Alibekova—Deputy Director at the Institute of Economics of the Science Committee of the Ministry of Education and Science of Kazakhstan
14. Mr Azimzhan Khitakhunov—Senior Research Fellow at the Eurasian Research Institute
15. Ms Assel Sarsenbayeva—Chairman of the Management Board at the Eurasian Research Institute
16. Ms Aidai Temikeeva—Deputy Director at the National Institute for Strategic Studies
17. Mr Altaaf Hasham—Management Program Liaison Officer at the Agha Khan Development Network (AKDN), Bishkek
18. Dr Indira Satarkulova—Acting Director at the OSCE Academy in Bishkek
19. Dr Aijan Sharshenova—Executive Director at Crossroads Central Asia
20. Mr Tuvshintugs Batdelger—Director at the Economic Research Institute
21. Ms Enkhzul Gonchigzeveg—Admin Officer at the International Think Tank for Landlocked Developing Countries (ITTLDC)
22. Ms Hadiqa Tanveer—Lecturer at the Department of Business Studies, Bahria Business School, Islamabad
23. Ms Ummara Razi—Lecturer and Research Associate at ILMA University
24. Mr Abid Qaiyum Suleri—Executive Director at the Sustainable Development Policy Institute (SDPI)
25. Ms Gulnora Beknazarova—Chairman of the Board of Directors at Zerkalo-Analytics
26. Mr Saidmurod Zainiddinzoda—Director at the Economic Research Institute of the Ministry of Economic Development and Trade
27. Mr Jahongir Dehkanov—Director at the Fund for Poverty Reduction
28. Mr Farkhod Khabibov—Adviser at the Office of the Assistant to the President of Tajikistan on Economic Issues
29. Mr Jumamuhammet Geldiyev—Senior Specialist at the Division for Financial Analysis of the Agro-Industrial Complex, Ministry of Environmental Protection
30. Mr Begli Gurbangeldiyev—Senior Scientific Associate at the International Science and Technology Park, Academy of Sciences
31. Mr Allanazar Kajarov—Lead Specialist at the State Environmental Expertise, Certification and Licensing Division, Ministry of Environmental Protection
32. Mr Abdurashid Bozorov—Head of the Sector for Foreign Economic Activities and Integration Processes at the Center for Economic Research and Reforms
33. Mr Daniyar Kurbanov—Head of the Department for the Study of Historical and Cultural Heritage and Humanitarian Research at the International Institute for Central Asia (IICA)
34. Mr Jang Ping Thia—Lead Economist and Manager of the Economics Department at the Asian Infrastructure Investment Bank

35. Mr Yang Yingming—Vice President at ADB
36. Ms Lyaziza G Sabyrova—Regional Head at the Regional Cooperation and Integration (CWRC), Central and West Asia Department (CWRD), ADB
37. Ms Altynay Arapova—Economist at the Regional Cooperation and Integration (CWRC), ADB
38. Mr Khalid Umar—Regional Cooperation Specialist at the Regional Cooperation and Integration (CWRC), ADB
39. Ms Akiko Terada-Hagiwara—Principal Country Specialist at the East Asia Department, RKSI
40. Ms Wang Dan—Knowledge Service Coordinator at RKSI
41. Mr Arman Ahunbaev—Head of the Centre for Infrastructure and Industrial Research at EDB
42. Mr Conrad Albrecht—Managing Director, Head of Sustainable Development Directorate at EDB
43. Mr Abdullaev Husegiv—From EDB
44. Ms Maria Krutskikh—Senior Expert, Marketing and Events at EDB
45. Mr Alisher Kamilov—Media Manager at EDB
46. Mr Sergei Ulatov—Deputy Managing Director at EFSD
47. Mr Artem Levenkov—From EFSD
48. Mr Gennady Vasiliev—From EFSD
49. Mr Maxim Titov—From EFSD
50. Mr Aliaksarov Erlan—From EFSD
51. Mr Arabyan Garik—From EFSD
52. Mr Shodyev Daler—From EFSD
53. Ms Karpenko Ekaterina—From EFSD
54. Mr Sergei Gorbachev—Media Manager at EDB
55. Dr Siddharth Saxena—Chairperson of the Cambridge Central Asia Forum at Cambridge University, Director of Cambridge Kazakhstan Centre, and Honorary Secretary of the Committee for Central and Inner Asia at CCAF
56. Mr Suat Beylur—Director at ERI
57. Mr Zhengizkhan Zhanaltay—Deputy Director at ERI
58. Mr Omirbek Hanayi—Senior Research Fellow at ERI
59. Ms Albina Muratbekova—Senior Research Fellow at ERI
60. Mr Erkinbek Turgunov—Research Fellow at ERI
61. Mr Almas Junisbayev—Senior Research Fellow at ERI
62. Ms Gulfarida Dosmetova—Administrator at ERI
63. Mr Marat Musabekov—IT Administrator at ERI
64. Dr S Sohail H Naqvi—Rector at the University of Central Asia
65. Mr Bakhrom Mirkasimov—Rector at Westminster International University in Tashkent
66. Dr Richard Pomfret—Professor at Adelaide University, Australia, and John Hopkins University, Italy
67. Mr Alessandro Pio—Scientific Advisor (Asia) at the Institute for International Political Studies, Milan, Italy
68. Mr Craig Steffensen—Consultant and Advisor to the World Bank on Central Asia
69. Dr Siddharth Saxena—Chairperson of the Cambridge Kazakhstan Centre and Cambridge Central Asia Forum
70. Mr Johannes F Linn—Nonresident Senior Fellow at the Global Economy and Development Program, Brookings Institution, Washington DC, USA
71. Mr Hans Holzhacker—Chief Economist at the CAREC Institute
72. Mr Norbert Funke—Director at IMF CCAMTAC, Almaty, Kazakhstan
73. Ms Marthe M Hinojales—Senior Economist, Regional Surveillance at ASEAN+3 Macroeconomic Research Office (AMRO), Singapore
74. Mr Suriyan Vichitlekarn—Executive Director at Mekong Institute, Thailand
75. Mr Iskandar Abdullaev—Country Representative for Pakistan at International Water Management Institute (IWMI)
76. Mr Roman Vakulchuk—Head of Climate and Energy Research Group at the Norwegian Institute of International Affairs (NUPI), Oslo, Norway
77. Dr Xianchun Tan—Professor at the Institutes of Science and Development, Vice-Director of the Center for Carbon Neutrality Strategy at the Chinese Academy of Sciences (CASISD)
78. Mr Kumar Utsav—Country Director at the ADB Kazakhstan Resident Mission
79. Ms Dina Azhgaliyeva—Senior Research Fellow at ADBI
80. Dr Asif Razzaq—Senior Researcher at the CAREC Institute

81. Dr Li Cangshu—Associate Research Fellow and Coordinator of the 'Dual Carbon' Project at the Center for International Knowledge on Development, PRC
82. Ms Subathirai Sivakumaran—Chief of Section, Financing for Development Section, Macroeconomic Policy and Financing for Development Division, United Nations Economic Commission for Asia and the Pacific (UNESCAP), Thailand
83. Ms Shu (Grace) Tian—Senior Economist, Economic Research and Development Impact Department at ADB
84. Ms Xiaojing Fei—Co-host of Impact Hub Asia–Pacific
85. Mr Kabir Jurazoda—Director at the CAREC Institute
86. Ms Jingjing Huang—Deputy Director I at the CAREC Institute
87. Mr Kuat Akizhanov—Deputy Director II at the CAREC Institute
88. Mr Xin Lei—Chief, Knowledge Management Division (KMD) at the CAREC Institute
89. Mr Josh Hu—Chief, HRFD and AD at the CAREC Institute
90. Dr Ilhom Abdulloev—Chief, Capacity Building Division at the CAREC Institute
91. Mr Ghulam Samad—Senior Research Specialist at the CAREC Institute
92. Ms Dilraba Adil—Planning Specialist at the CAREC Institute
93. Ms (Jesscy) Xiaohong Hu—Coordination Specialist at the CAREC Institute
94. Ms Na Li—Administration Specialist at the CAREC Institute
95. Mr Rick Yu—Administration Specialist at the CAREC Institute
96. Ms Sofya—Russian–English Interpreter
97. Ms Janna—Russian–English Interpreter
98. Mr Mehryar Ali Khan—Consultant and Rapporteur

+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