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Carbon Pricing Policy Opportunities in Central Asia and Azerbaijan

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This joint report by the Eurasian Development Bank (EDB) and the CAREC Institute (CI) provides a comprehensive analysis of the status, prerequisites and prospects of the carbon pricing instruments in Central Asia and Azerbaijan. The study produces a cross-country analysis of emissions structure and the institutional background relating to climate policies. It also presents the climate pricing Readiness Assessment Tool, to evaluate countries' readiness for carbon pricing and carbon pricing frameworks. The study explores carbon pricing frameworks for each of the selected countries and provides recommendations for policymakers. It seeks to contribute to the discussion about opportunities for introducing or developing carbon pricing frameworks, provide insights into attitudes towards carbon pricing at a country level, and promote prospective designs of carbon pricing frameworks for the Central Asian countries and Azerbaijan. The study may also lay the groundwork for modeling of economic and social outcomes of implementing carbon pricing in developing countries.

Keywords: Central Asia, Azerbaijan, carbon pricing, climate policy, carbon emissions, low-carbon growth, carbon tax, ETS, NDC

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Notes:

In this report, "$" refers to United States dollars.
ADB recognizes "China" as the People's Republic of China.

Contents

Acknowledgment 5

Introductory Note by the Chief Economist of the Eurasian Development Bank ... 6

Foreword by the Director of the CAREC Insitute 8

Executive Summary 10

Introduction 15

1. Overview of Carbon Pricing Frameworks 17

1.1 Global State of Carbon Pricing 17

1.2 Prerequisites for Introducing Carbon Pricing Instruments 19

1.3 Carbon Pricing Practices and Challenges 20

1.4 Future Direction of Carbon Pricing Adoption 22

2. Overview and Analysis of GHG Emissions in Selected Countries 23

2.1 Emission Footprint in Central Asia and Azerbaijan 24

2.2 Carbon Intensity of GDP 25

2.3 Sectoral Emissions in Central Asia and Azerbaijan 26

2.4 Country Level Analysis 29

Azerbaijan 29

Kazakhstan 30

Kyrgyzstan 31

Tajikistan 32

Turkmenistan 33

Uzbekistan 34

3. Climate Policies in the Selected Countries 35

Azerbaijan 38

Kazakhstan 40

Kyrgyzstan 43

Tajikistan 46

Turkmenistan 48

Uzbekistan 50

4. State of Carbon Pricing in Central Asia and Azerbaijan 53

Azerbaijan 56

Kazakhstan 59

Kyrgyzstan 68

Tajikistan 72
Turkmenistan 74
Uzbekistan 77

5. Carbon Pricing Introduction: Evaluation for Selected Countries 81
5.1 Developing a Readiness Assessment Tool for Carbon Pricing 81
5.2 Assessing Countries' Readiness for Introducing Carbon Pricing Instruments 95
Azerbaijan 96
Kazakhstan 98
Kyrgyzstan 99
Tajikistan 101
Turkmenistan 102
Uzbekistan 103

6. Conclusions and Policy Recommendations 105

Annex 108

References 118

Abbreviations 126

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Ms. Evgenia Klochkova, representing the EDB team, provided climate policy reviews and analysed prerequisites for carbon pricing. Mr. Ghulam Samad from CAREC Institute, and Mr. Ghulam Nabi (independent economist) collected and analyzed emissions-related data to produce foundational analysis. The two teams worked closely together to develop the Readiness Assessment Tool for Carbon Pricing and provide useful policy recommendations.

We would also like to acknowledge the valuable contributions and support of Dr. Evgeny Vinokurov (EDB Chief Economist), Dr Alexander Zaboev (Head of the EDB's Centre for Integration Studies), Dr Vladimir Pereboev (Head of Projects, EDB Academy), and Dr. Kuat Akizhanov Deputy Director two, CAREC Institute.

We would like to express our gratitude to the external experts who reviewed the report and provided their comments. Our special thanks also go to the Climate Policy Initiative team who provided valuable feedback.

We hope that this report will contribute to the development of the comprehensive and balanced carbon pricing policies and lay the groundwork for the further assessment of outcomes of the carbon pricing implementation in developing countries.

Introductory Note by the Chief Economist of the Eurasian Development Bank

Evgeny Vinokurov,
Vice Chairman and Chief Economist,
the Eurasian Development Bank

I am pleased to present the report "Carbon pricing policy opportunities in Central Asia and Azerbaijan", a joint product of the CAREC Institute and the Eurasian Development Bank.

The carbon pricing is a tool for reducing emissions and thus aligning with the objectives of the Paris Agreement. An increasing number of countries are considering carbon pricing as a key tool in achieving their climate-related targets. Incidentally, while we were drafting this paper, five additional carbon pricing instruments came into effect. For those who are still catching-up, the delays could have a negative impact on long-term competitiveness, as many jurisdictions — not only EU — are considering taxation on carbon-intensive imported goods.

Emission trading schemes and carbon taxes generate additional revenue — over $100 billion per year globally. This is a double-edged sword. On the one hand, this revenue can be allocated into green projects. On the one hand, this is a quasi-tax imposed on producers, visibly skewed towards developing countries. This way or another, this is a reality exporters and producers have to live with.

Developing economies all over the world — and in the EDB zone of operations as well — want to grow not only sustainably but also rapidly. This dual task requires industrialization and growing exports. Thus, working with the issue of carbon pricing is necessary. The countries of Central Asia and Azerbaijan that fall within the scope of this research account for only about 1% of global greenhouse gas emissions. They all address the carbon pricing dilemma in different ways. Some of them consider its implementation in the long-term, while others are concerned about the potential downsides for the economic growth. In some cases, carbon pricing is already an integral part of national climate policy landscape, while in others, climate adaptation instruments are prioritized over mitigation. The global benchmarks recommend a wide range of carbon prices, from $25 to $120 per tonne of CO_2.

This turns the exercise of carbon taxation into a complex equation with many unknowns. There is no universally applicable approach to carbon pricing. This is a challenge that requires coordination of numerous stakeholders' interests and alignment with the broader national strategies.

This report provides a comprehensive overview of the prerequisites for introducing carbon pricing, as well as the key enablers and barriers that should be considered. It outlines a number of factors shaping readiness assessment tool and demonstrates its actual use in the context of the Central Asian countries and Azerbaijan. The paper provides recommendations for policymakers that can facilitate further discussion on tailor-made carbon pricing policies and instruments and assist in preparatory work. Based on the country-specific conditions, it is possible to determine an appropriate policy mix. This will enable achievement of climate targets while using the existing advantages and ensuring that socio-economic development is not compromised.

The Eurasian Development Bank is committed to promoting balanced green growth. We are therefore interested in research, technical assistance and investment opportunities that have the potential to stimulate low-carbon industries. This is our first report dedicated to the prospects of carbon pricing in Central Asia and Azerbaijan, as well as the first report prepared in cooperation with the esteemed CAREC Institute. We hope that this research will generate new ideas, encourage collaboration, and help our member states and other countries.

Foreword by the Director of the CAREC Insitute

Charymuhammet Shallyyev,
Director, CAREC Institute

I am pleased to present the report "Carbon pricing policy opportunities in Central Asia and Azerbaijan", a joint product of the Eurasian Development Bank and the CAREC Institute.

Carbon pricing has emerged as one of the most effective and timely policy instruments to align economic growth with environmental sustainability. For the CAREC region, where countries face diverse energy structures and development needs, advancing carbon pricing is not only an environmental imperative but also a strategic economic opportunity. It enables member countries to accelerate their transition to low-carbon pathways, mobilize green investments, and integrate more effectively into global markets that are increasingly guided by carbon regulations.

This report highlights several important findings. First, the Central Asia and Azerbaijan have already taken steps toward climate policy and carbon pricing readiness, but implementation remains uneven and at an early stage. Energy systems remain carbon-intensive, and current policies are not sufficient to achieve long-term climate commitments. Second, there is clear potential for both domestic and regional action. Introducing carbon pricing can help reduce emissions cost-effectively, generate fiscal revenues to support just transitions, and send the right signals for private-sector innovation. Third, international experiences show that well-designed carbon pricing—adapted to national circumstances and coordinated across borders—can also enhance competitiveness, ensure social equity, and unlock green growth opportunities in Central Asia and Azerbaijan.

The report recommends that Central Asia and Azerbaijan can strengthen their institutional readiness for carbon pricing, enhance data and monitoring systems, and adopt gradual but credible pricing trajectories. It also emphasizes the importance of complementary measures, such as energy subsidy reforms, targeted support for vulnerable groups, and investments in renewable energy and energy efficiency. Regional collaboration—through knowledge exchange, capacity building, and potential carbon market linkages—can amplify the impact of national actions.

The CAREC Institute remains deeply committed to supporting our member countries in advancing climate-related priorities. Through evidence-based policy research, analytical tools, and tailored capacity-building programs, we will continue to work with governments, private sector partners, and development organizations to build pathways toward low-carbon, climate-resilient economies. This report is part of our broader commitment to provide timely knowledge solutions, foster policy dialogue, and strengthen regional cooperation in addressing one of the most pressing challenges of our time.

Executive Summary

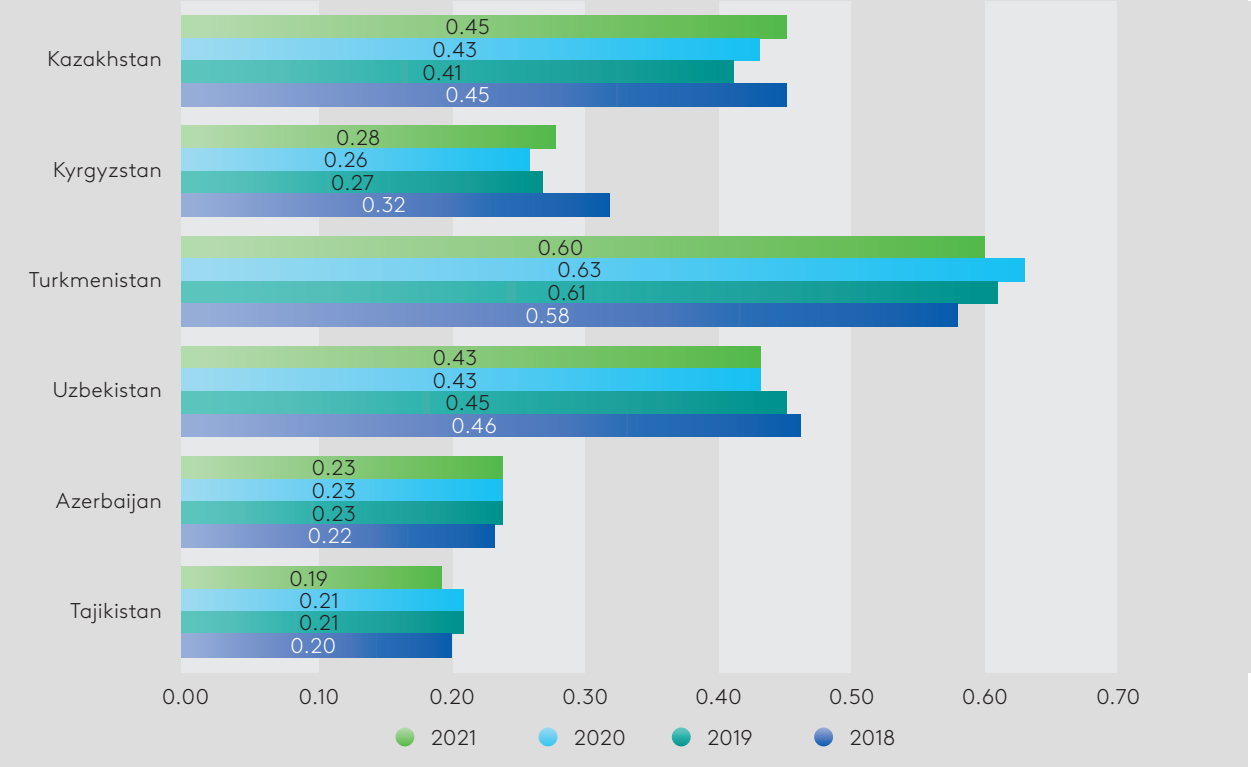
1. Carbon pricing is one of the most powerful climate-related policy instruments to reduce carbon emissions in a flexible way. **While serving its primary goal of climate change mitigation, when implemented effectively it can also generate revenue that can be reinvested to promote green technologies and provide market participants with more clarity and predictability about emissions levels, supporting long-term planning and decision making.** Initially more widespread in high-income economies, carbon pricing mechanisms are now also increasingly being adopted in middle-income countries, reflecting a global shift toward more inclusive climate engagement. As of 2024, 75 carbon pricing instruments (CPIs) are operational worldwide, highlighting the instrument's versatility and applicability in different economic contexts (World Bank, 2024). More interest to carbon pricing could be expected amid the recent progress made at COP29 around the international carbon trading rules.

2. **The deployment of CPIs presents significant challenges, as it requires robust policy and regulatory frameworks as well as institutional capacity.** Effective administration, monitoring, rules-setting mechanisms, defined targets and timelines are critical to achieving emissions reduction. Equally important is the support of stakeholders, as public perception of carbon pricing could be mixed.

3. **The share of countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) and Azerbaijan in global greenhouse gas (GHG) emissions is very small (1.4%)**, with Kazakhstan and Uzbekistan having the highest share in the region (0.73% and 0.32%, respectively) (IEA, 2024). The share of these countries in global GDP and population is even smaller: 0.87% and 1.08%, respectively. In terms of carbon intensity per GDP, Turkmenistan has the highest value among the countries considered (0.60 kg CO_2 per USD). Although these ratios may seem negligible on a global scale, the region's collective contributions could play a crucial role in global climate efforts and sustainable economic growth.

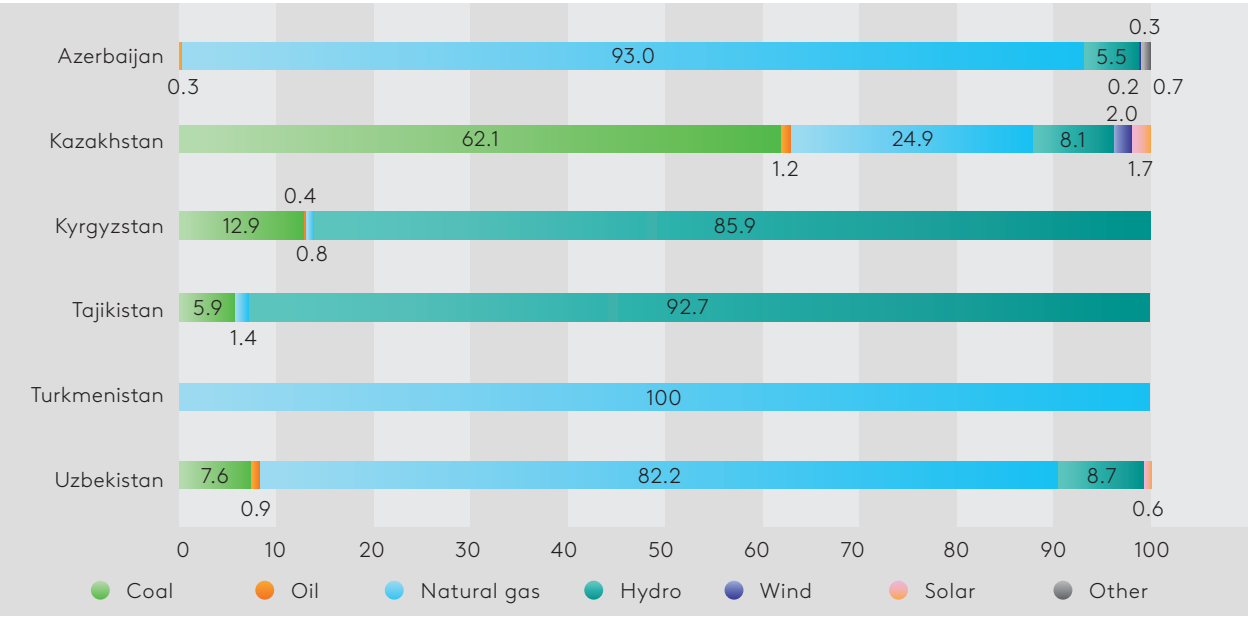
4. **The energy sector is responsible for the largest share of carbon emissions in all countries of the region except Kyrgyzstan and Tajikistan, where agriculture is the largest emitting sector**. Azerbaijan, Kazakhstan, Uzbekistan, and Turkmenistan have a larger footprint due to their dependence on coal and natural gas for power generation, industry, and transportation, while Kyrgyzstan and Tajikistan have the largest share of renewables in power generation — 67.9% and 87.2%, respectively (IEA, 2022). This sharp contrast reflects the region's economic diversity and emphasizes the importance of context-specific climate policies.

↓ **Figure A. Emission Intensity of GDP, 2018–2021, kg CO_2 per USD**



Source: SDG Indicator 9.4.1, UNECE, 2024.

↓ **Figure B. Electricity Generation Sources, %**



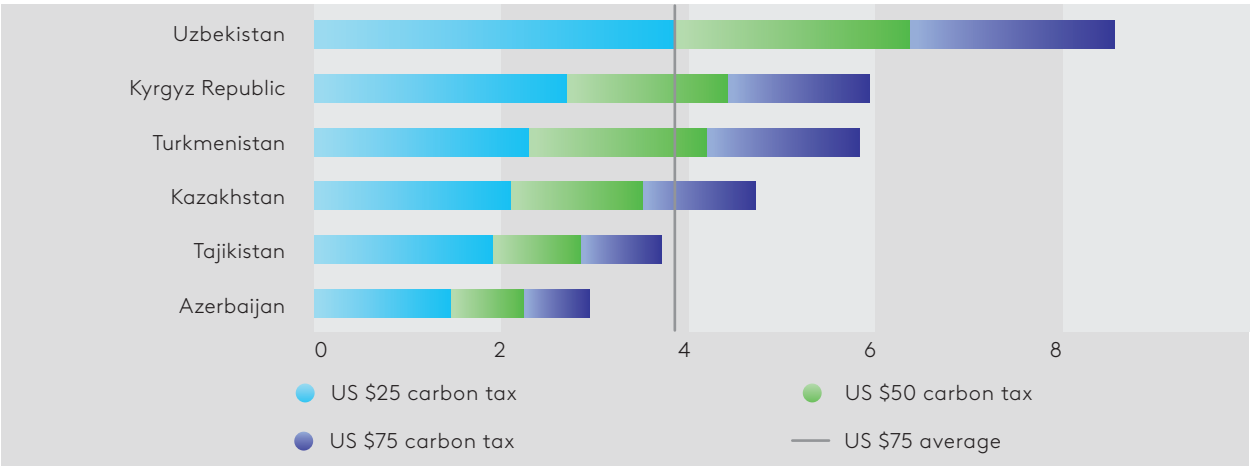
Source: IEA, 2022.

5. **Central Asian countries and Azerbaijan are actively integrating climate-related provisions in their policies, considering international agreements and tailoring best practices to national conditions and priorities**. All countries in the scope of this research have developed Nationally Determined Contributions (NDCs). The countries also recognize development and expansion of renewable energy sources as priorities of climate policy. Kazakhstan and Kyrgyzstan have

taken decisive action by committing to net-zero emissions targets, showcasing their ambition to lead the climate agenda in the region. Tajikistan carved out a unique approach, being the only country in the scope of this research that prioritizes adaptation over mitigation, addressing its vulnerability to climate impacts.

6. CPIs are considered to be a power tool to meet the NDCs, and also a source of additional revenue contributing to the strength of national budgets. By pricing carbon, governments can encourage markets to reduce emissions and build a financial base for climate technologies and sustainable development initiatives. According to the IMF, the current mitigation policy mix in Azerbaijan, the Kyrgyz Republic, and Kazakhstan may not be sufficient to curtail emissions to their target, while Uzbekistan and Tajikistan appear to be on track to meet their unconditional commitments (IMF, 2023). **The IMF assesses that the weighted average NDC emissions target in the Caucasus and Central Asia can be met with a uniform US$25 per tonne of CO_2 carbon tax on average, which could generate about 2.6% of GDP in revenue in the Caucasus and Central Asia** (for example, almost 3% of GDP in Turkmenistan and Uzbekistan) (IMF, 2022). Nevertheless, the possible downsides for businesses and households from introducing the carbon tax of this value should be also considered case by case.

↓ **Figure C. Potential Carbon Tax Revenue, % of GDP, 2030**



Source: Country authorities; and IMF staff calculations.
Note: Estimations are based on a model calculation from the IMF Fiscal Affairs Department's Carbon Pricing Assessment Tool.

7. Although all the countries in the scope of this research have pledged to reduce emissions, their **approach, willingness, and readiness to move to specific CPIs are strikingly different**. Among these nations, only Kazakhstan has a CPI in place. Azerbaijan signaled the development of a Zero Emissions Development Strategy that could include carbon tax as an incentive. Uzbekistan is taking incremental steps towards carbon pricing by building the necessary infrastructure and institutions. The reasons for both common and different practices lie in the

diverse economic structures and GHG emissions profiles, when some factors defining the country's readiness to introduce carbon pricing require additional examination prior to decision-making, ensuring that future CPIs are both feasible and impactful.

8. **The Readiness Assessment Tool was developed to assess a number of factors that could influence the importance of carbon pricing for achievement of a national climate target, the country's readiness for fiscal climate regulation, and the potential effectiveness of such an instrument in the national context.** It includes such country-specific criteria as economic and emissions profiles, climate policy focus and level of NDC, current policy gaps and overlaps, Measurement, Reporting, and Verification (MRV) systems, the existing carbon markets track record, institutional capacity, and efficiency of stakeholder engagement.

9. **Analysis of the Central Asian countries and Azerbaijan demonstrates that CPI could not be considered as a "one-size-fits-all" approach, underscoring the need for tailored strategies to maximize the value and impact they would generate for the country**.

   - **Azerbaijan** is more integrated into international trade, and is taking some efforts to join carbon markets. Using the momentum of being a COP29 host country, Azerbaijan could consider fiscal carbon measures to raise the competitiveness of its exports and pave the way for further diversification of its carbon-intensive economy.

   - **Kazakhstan** is a unique example of a country that already has a CPI in the form of the emission trading system (ETS). The country's low-carbon ambitions prove that carbon pricing is justified for its importance, efficiency, and readiness; it is considered a key element of carbon regulations; and the country will follow the path of further adjustment of its CPI.

   - **Kyrgyzstan** has a unique intention to create a vision of a "negative emissions" country. Considering the country's energy mix and its ambition to further increase RES generation, introduction of CPI is not a binding requirement for the country to achieve its climate commitments. Kyrgyzstan lacks internal prerequisites for CPI implementation, but could use opportunities of carbon markets and other sources of international funding to support decarbonization.

   - **Tajikistan** is the region's lowest CO_2 emitter and prioritizes adaptation over mitigation, given its acute vulnerability to climate change effects. The country also has opportunities for green growth that are sufficient to reach its NDC and could be beneficial in the international carbon markets. Nevertheless, the country acknowledges the need to gradually reduce energy subsidies that hamper investment in clean technologies.

- **Turkmenistan** is the largest emitter of GHGs relative to GDP in the Central Asia, and does not plan to raise its climate mitigation ambitions, prioritizing economic growth. Introduction of CPI could be considered as a beneficial, but premature measure, since the country lacks the initial elements of climate regulation. Gradual phase-out of fossil fuel subsidies, which are the highest in the world, could be a significant prerequisite for efficient climate policies.

- **Uzbekistan** has most prerequisites for efficient carbon pricing in place, and introducing CPI could be considered as a reasonable next step on the country's low-carbon development path. Moreover, the country has some experience in the global carbon trade and is already establishing its MRV system, which would provide assistance in future CPI implementation.

10. According to the common and different features of the countries in the scope of this research, as well as the challenges that could arise when designing carbon policy, **the following steps can be recommended when considering introduction of a CPI:**

- First, **to conduct a readiness assessment** to identify the level of development of the carbon pricing policy, mechanisms and instruments, and technical readiness required in each country. This stage also includes establishing an institutional MRV system that would be beneficial to any climate policy. A country should also assess how fossil fuel subsidies could be gradually phased out while also ensuring safety net to the most vulnerable population.

- Second, if the preparatory work indicates a need and readiness of a country to implement CPIs, **carbon pricing enablers should be strengthened.** This stage could include alignment of carbon pricing policies with complementary country's policies as well as harmonization of the CPI frameworks with the national and regional context. It is also important to provide institutional capacity-building for efficient carbon pricing, as it requires additional efforts and skills for administration. Additionally, stakeholder engagement and public awareness to gain public buy-in will secure longer-term policy stability.

- Third, regardless of whether carbon pricing is considered premature or unnecessary at the current stage of climate policies, **a country could still unlock a wide range of complementary instruments to promote low-carbon growth**. These instruments could include feed-in-tariffs incentivizing renewable energy investments, mechanisms for emission reduction or tradable carbon credits, and international funding opportunities via development banks, funds, and other agencies. Such tools could serve as effective transitional decarbonization measures that would be added to future carbon pricing systems.

Introduction

Carbon pricing is a globally recognized and efficient tool to reduce greenhouse gas emissions. While scientific knowledge and public awareness of the consequences of climate change and measures of mitigation increase, carbon pricing evolves, already reaching middle-income countries. Carbon pricing has numerous benefits for climate policy: it may have a direct impact on emissions reduction, encourages incentives for greener growth and energy transition providing clear price signals and enabling private finance mobilization. Moreover, carbon pricing revenue could be used to fund climate-related initiatives. The design of the carbon pricing instruments allows for flexibility in terms of sector and gas coverage, allowance amounts, and other parameters. At the same time, the prospective downsides of this approach do not allow it to be considered as a "one-size-fits-all" solution. Carbon pricing often gets low support from public and business, being perceived as an unfair burden, preventing economic growth. Introduction of efficient carbon pricing requires an advanced measurement, reporting, and verification system, adjustment of related policies, as well as balancing interests of numerous stakeholders.

Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) and Azerbaijan account for about 1% of global GHG emissions, but their average per capita emissions are higher than the world average (0.54 versus 0.32, respectively) (European Commission, 2024). These countries have committed to the Paris agreement, are developing and updating their National Determined Contributions, and play an active role in the global climate agenda. Even though only Kazakhstan has successfully introduced an emission trading scheme, all of the selected countries are now considering carbon pricing instruments at different levels in their institutions.

This study seeks to identify the country-level prerequisites for introducing carbon pricing instruments, and factors that could influence climate policy decision-making. The study also seeks to contribute to the discussion about opportunities for introducing or developing carbon pricing frameworks, provide insights on country-level attitude to carbon pricing, promote prospective designs of carbon pricing frameworks for the Central Asian countries and Azerbaijan. The study will also lay the groundwork for the further modeling of economic and social outcomes for the implementation of carbon pricing in developing countries. The study may also help to introduce a region-wide carbon pricing scheme. To address these key considerations, the study adopted a thorough desk study approach, to review thoroughly the underlying considerations. To corroborate the findings, stakeholders were also consulted.

The study produces a cross-country analysis of emissions structure and the institutional background related to climate policies, as well as the climate pricing Readiness

Assessment Tool, to assess countries' readiness for carbon pricing and carbon pricing frameworks. The study explores carbon pricing (either ETS or carbon tax) frameworks for each of the selected countries, as well as recommendations for policymakers.

The study has six chapters: Chapter 1 describes the concept of the carbon pricing, its commonly used practices and challenges. Chapter 2 presents trends and snapshots of the overall emissions by region and by country, and their sectoral breakdown. Chapter 3 provides an overview of climate-related regulation, its scope and recent developments in the selected countries. Chapter 4 identifies the current place of carbon pricing instruments in the policy approaches of the selected countries, the perception of this tool among different stakeholders, the experience of a country in carbon trading, and other country-level prerequisites, risks, and opportunities for introducing a carbon price. Considering the differences in regulatory environment, greenhouse gas emissions structure, country-level climate ambitions, and the other factors revealed in Chapters 1–4, Chapter 5 suggests developing the Readiness Assessment Tool. The tool consists of questions addressing different dimensions of the issue: the importance of a carbon pricing for achievement of national climate targets; the country's readiness for fiscal climate regulation; and the potential effectiveness of such an instrument in the national context. Chapter 5 provides a country-level readiness analysis using the suggested tool. In Chapter 6, the authors offer their vision of the possible steps to be taken for more efficient decision-marking on carbon pricing.

The draft of the paper was submitted for review and feedback to regulatory bodies of the countries in the scope of the research who oversee the climate policies, as well as to several think tanks and research centers. The authors of the study would like to acknowledge their gratitude to all those who provided the comments.

1. Overview of Carbon Pricing Frameworks

Carbon pricing is a market-based instrument that aims to co-opt costs for the environment which are associated with negative externalities such as carbon emissions, thus encouraging industries, manufacturing hubs, and individuals to adopt green technologies and clean practices. There is an agreement among most policymakers that the economy-wide execution of carbon pricing will be a necessary but not sufficient element of any policy effort that can enable the achievement of cost-effective CO_2 reductions (Metcalf 2007; Kaplow 2010; Borenstein et al. 2019). The main advantage of the carbon pricing approaches is their flexibility for achieving overall cost-effectiveness, which can significantly reduce long-term abatement costs by inducing green technologies and innovations.

There are two main types of carbon pricing approaches: the cap-and-trade or Emission Trading System (ETS) and carbon taxes. However, there is low agreement among scientists about effective carbon pricing approaches; some policymakers support carbon tax (Nordhaus, 2007), and others support cap-and-trade (Keohane, 2009). The carbon tax is imposed directly on the carbon content of fossil fuel, ideally upstream in the industrial process where fossil fuels enter the economy. It increases the cost of carbon intensity, thereby encouraging the use of lower-carbon alternatives such as technological innovation. By contrast, upstream cap-and-trade or an ETS assigns scant permits for quantities of greenhouse gases (GHGs). In other words, ETS sets a limit on the total amount of GHG emissions and allows businesses to buy and sell emission permits for their industrial activities. The limit is gradually reduced over time to create a financial incentive to lower emissions.

1.1 Global State of Carbon Pricing

As of 2024, carbon pricing has seen significant development and expansion around the globe, although remaining uneven in its implementation and effectiveness. According to the World Bank report on "State and Trends of Carbon Pricing 2024" (World Bank, 2024), carbon pricing revenue reached a record $104 billion in 2023. Nearly 50% of carbon pricing revenue was used to fund climate solutions and nature-based programs. The report also stated that there are 75 carbon pricing instruments operational worldwide: 39 taxes and 36 ETSs.

$104 billion

Carbon pricing revenue in 2023, according to the "State and Trends of Carbon Pricing 2024" by the World Bank

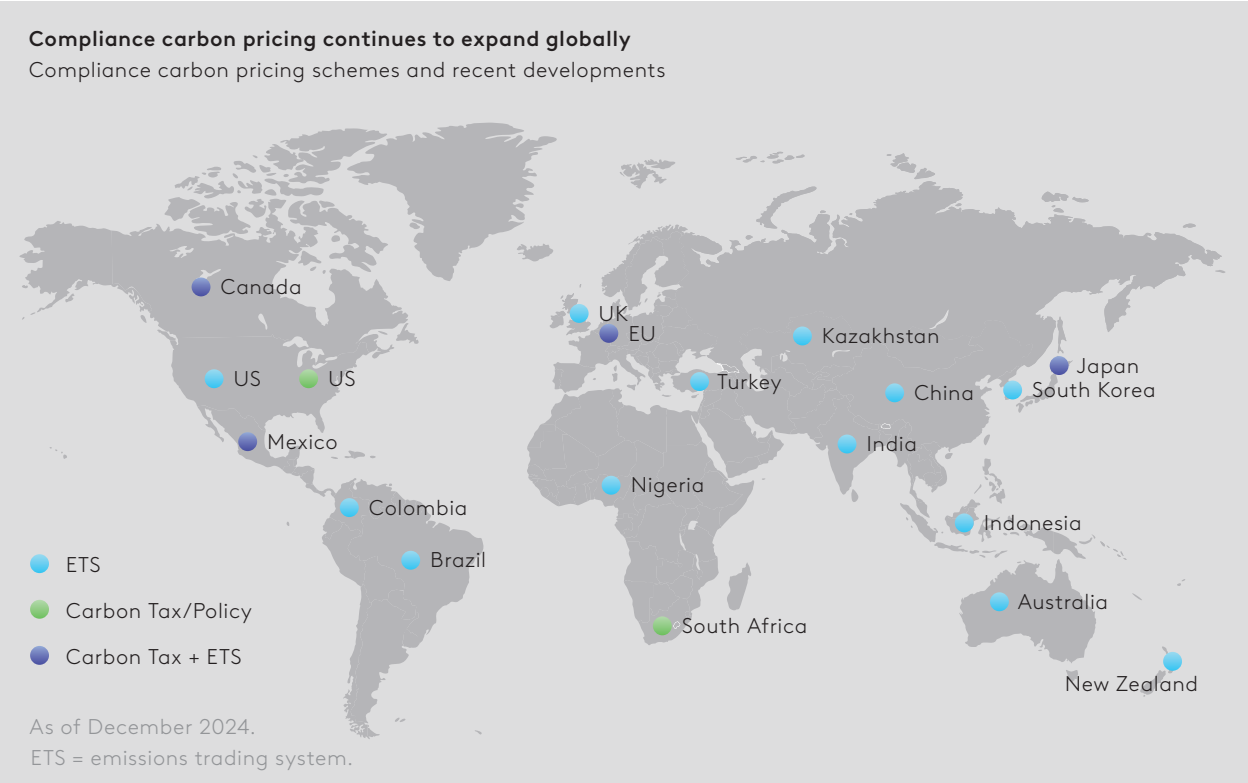
> *"Carbon pricing can be one of the most powerful tools to help countries reduce emissions. That's why it is good to see these instruments expand to new sectors, become more adaptable, and complement other measures,"*
>
> Axel van Trotsenburg, World Bank Senior Managing Director (World Bank, 2024)

Carbon pricing serves multiple economic purposes. First, it causes a wide range of behavioral changes to reduce the consumption of energy and transition to low-carbon fuels (Parry et al, 2022). For example, carbon pricing approaches serve as an indicator for emitters to reduce emissions by modifying their practices or to continue with the same emissions with associated costs. Second, carbon pricing promotes investment in alternative and green technologies for energy (Berahab, 2024); for example, the higher costs spur innovation and the adoption of new and energy-efficient technology. Lastly, carbon pricing generates new revenue streams and helps develop effective strategies that reduce GHG emissions as well as promote sustainable economic growth and a healthy environment (Berahab, 2024).

Adoption of carbon pricing was limited during 2023; however, there are encouraging signs, particularly in middle-income economies. Brazil, the Republic of Korea, India, and Türkiye have made significant progress toward the implementation of carbon pricing. The European Union Carbon Border Adjustment Mechanism (CBAM), which began in 2023, contributed to some progress in this area. Intended to reduce carbon emissions, it requires importers to provide specified reports of embedded emissions in imported products. Slovenia reinstated its carbon tax policy, new carbon taxes were implemented in Taiwan, China, and the Mexican state of Guanajuato. Japan created a new voluntary ETS in October 2023.

Figure 1 shows a current use of carbon pricing (ETS and carbon tax) globally.

↓ **Figure 1. Use of Carbon Taxes and ETSs**



Source: S&P Global Commodities Insights, 2024.

1.2 Prerequisites for Introducing Carbon Pricing Instruments

Carbon transactions are typically correlated with emissions permits, evaluation of abatement options, and Monitoring, Reporting, and Verification (MRV) of carbon emissions, and the price of carbon emissions via market forces. There are some prerequisites for introducing carbon pricing instruments, but it also requires compliance with the several terms.

First, carbon pricing is considered the most effective policy tool for mitigation. It can easily bend to achieve cost-effective emission reductions across countries and regions (IPCC, 2022). The potential avenue for the implementation of carbon pricing is via gradual introduction along with targeted support. Carbon pricing is largely concentrated in high-income economies. European economies and North America implemented carbon pricing mechanisms at some level of emissions. The policies are primarily implemented in the United States at the subnational level, the People's Republic of China has national ETS program.

Second, the carbon pricing mechanism provides certainty about emission levels; for example, ETS makes it appealing for policymakers to develop specific, measurable targets for emission reduction.

In all cases, implementation requires establishing clear objectives for the carbon pricing mechanisms: reducing emissions, promoting clean technology, generating revenue for the economy, and achieving goals of a global agenda for sustainable development.

Policymakers and stakeholders, including businesses, industry groups, environmental organizations, and the public in general, should build the support that is needed to understand carbon-pricing mechanisms, and to design and implement strategies that can drive concrete and equitable change.

Implementation is also challenging due to the institutional capacity to operate carbon pricing approaches, especially in developing countries. Further, defining ETS rules requires regulatory and legislative amendments; a regulatory authority needs to be established to oversee carbon pricing mechanisms, set prices, monitor emissions, and enforce compliance. The institutional coordination, flexibility, adaptation, market structure, economic and environmental analysis, use of revenue, regular reviews, etc., prerequisites help policymakers lay the basic infrastructure for the implementation of carbon pricing that contributes to the broader goals of combating climate change, achieves sustainable development, and fosters a transition to a low-carbon economy.

1.3 Carbon Pricing Practices and Challenges

The effectiveness of carbon pricing drives positive environmental and economic benefits if designed and implemented thoughtfully, following some practices for implementing carbon pricing effectively. In terms of administrative practice, carbon tax is a simpler form because it falls under the horizon of finance ministries and is easier to administer because it can be piggybacked on existing fuel taxes (Parry et al, 2022). A tax on carbon emissions provides simplicity and predictability, while the ETS can provide certainty about emissions abatement and flexibility. Policymakers suggested a combined method for optimal output, while conceding the challenge of complexity and regulation. Table 1 explains the practice and respective challenges of carbon tax and ETS. Regardless of the chosen instrument, a robust monitoring, reporting, and verification system to ensure accurate measurement needs to be implemented for compliance with carbon pricing.

↓ **Table 1. Summary Comparison of Carbon Tax and ETSs**

Practice	Carbon Tax	ETS
Administration	Administration is more straightforward (for example, as an extension of fuel taxes)	May not be practical for capacity-constrained countries
Uncertainty: price	Price certainty can promote clean technology innovation and adoption	Price volatility can be problematic; price floors and cap adjustments can limit price volatility
Uncertainty: emissions	Emissions are uncertain, but tax rate can be periodically adjusted	Certainty about emissions levels
Revenue: efficiency	Revenue usually accrues to finance ministry for general purposes (for example, cutting other taxes, general investment)	Free permit allocation may help with acceptability, but lowers revenue; the tendency for auctioned revenues to be earmarked
Revenue distribution	Revenues can be recycled to make overall policy distribution neutral or progressive	Free allowance allocation or earmarking may limit the opportunity for desirable distributional outcomes
Political economy	Can be politically challenging to impose new taxes; the use of revenues and communications is critical	Can be more politically acceptable than taxes, especially under free allocation
Competitiveness	Border carbon adjustment is more robust than other measures (for example, threshold exemptions and output-based rebates)	Free allowances effective at modest abatement level; border adjustments (especially export rebate) subject to greater legal uncertainty
Price level and emissions alignment	Needs to be estimated and adjusted periodically to align with emissions goals	Alignment of prices with targets is automatic if emissions caps are consistent with mitigation goals
Compatibility with other instruments	Compatible with overlapping instruments (emissions decrease more with more policies)	Overlapping instruments reduce emissions price without affecting emissions, through caps that can be set or adjusted accordingly
Pricing broader GHGs	Amenable to taxes or proxy taxes, building off business tax regimes; feebate variants are sometimes appropriate (for example, forestry)	Less amenable to ETS; incorporating other sectors through offsets may increase emissions and is not cost-effective
Global coordination regimes	Most natural instrument for international carbon price floor	Can comply with international price floor, mutually advantageous trades from linking different ETS, but does not meet global emissions requirements

Source: Parry et al (2022), IMF staff
Note: Green indicates an advantage of the instrument; orange indicates neither an advantage nor a disadvantage; red indicates a disadvantage of the instrument.

1.4 Future Direction of Carbon Pricing Adoption

The global call for carbon pricing has gained significant momentum; however, there is a notable difference in coverage and price levels among countries (Parry et al, 2022). Carbon pricing has been limited over the last year, but there are propitious indications of future uptake, particularly in middle-income countries. The adoption of the mechanism process depends on future price expectations. Multiple carbon pricing approaches are continuously implemented in new territory, but at a slow pace.

The carbon price mechanisms can be a stimulating indicator for investment in technologies and accelerate research and development to enhance efficient ways to consume energy for businesses and individuals, which makes it possible to reduce reliance on high carbon emitting across sectors.

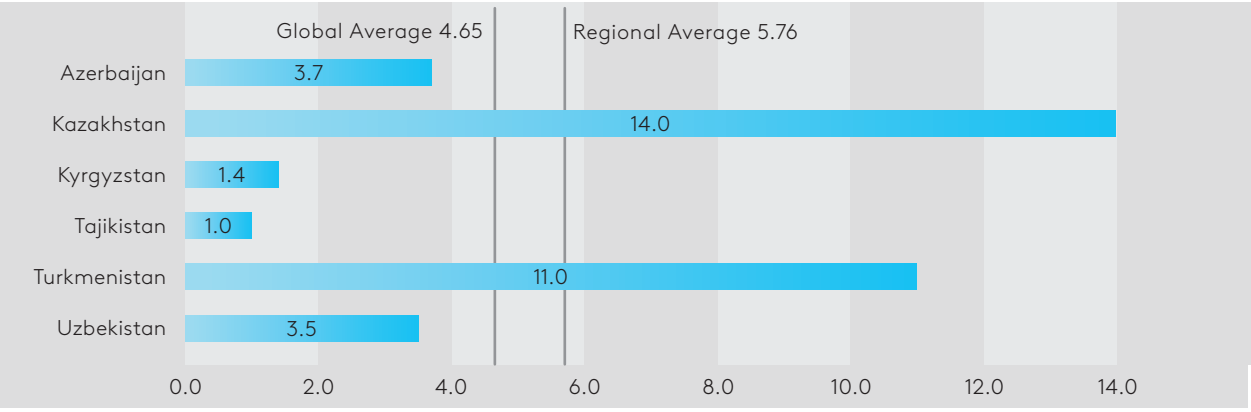
The present and future abatement costs of carbon emissions are affected by high uncertainty of economic stability, volatility of fuel prices, and the feasibility of green technologies. However, research indicates that carbon tax provides some certainty about future abatement costs by laying the future trajectory of tax rates that allows market forces to adjust emission levels (Taschini et al, 2014; Parry et al, 2022). Efforts are underway to harmonize carbon pricing policies internationally to prevent competitive disadvantages and enhance effectiveness. Initiatives have been established in many countries with the existing carbon tax and the purpose of expanding carbon pricing mechanisms into new sectors.

2. Overview and Analysis of GHG Emissions in Selected Countries

The Central Asian region and Azerbaijan[1] are continuously impacted by climate change. To overcome the impact of climate change, the countries of the region have pledged Nationally Determined Contributions (NDCs) under the Paris Agreement. The countries in the region have specialized in emission-intensive sectors: electricity, chemicals, and mining. This leads to the highest shares of carbon dioxide emissions in the world in value-added manufacturing (ADB, 2024). Countries in the Central Asian region remain major sources of fossil fuels for the global economy, particularly in the form of oil and gas, and the consumption of fossil fuels in the region has been growing since 2010 (Palazuelos and Fernández 2012; Vakulchuk 2016; Vakulchuk et al, 2022). Coal remains one of the main energy sources for these countries, and its consumption is on the rise in Kyrgyzstan and Tajikistan. Coal use for heating purposes was one of the main reasons Bishkek became the world's most polluted city in 2021 (World Air Quality 2021; Sabyrbekov and Overland 2020).

The per capita emissions of the Central Asian region show the accelerating emissions due to predominance of emission-intensive sectors in economy. Figure 2 shows the per capita carbon emissions of the Central Asian region, as well as the world's average per capita emission of 4.65 metric tonnes. Kazakhstan has the highest per capita carbon emission in the region of 14 tonnes, followed by Turkmenistan (11 tonnes). Figure 2 shows that the average per capita emission of this region (5.76 tonnes) is much higher than the global average.

↓ Figure 2. Per Capita CO_2 Emissions, 2022



Source: IEA, 2024.

Table 2 shows the change in emissions since 2000. Kazakhstan emitted 14.0 metric tonnes of carbon dioxide in 2023, an increase of 4.57 tonnes per capita since 2000. Turkmenistan's carbon emissions have increased by 2.42 tonnes per capita since 2000.

[1] Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan

Table 2 also indicates that the per capita emissions of Kyrgyzstan and Tajikistan are the lowest, but their steady growth is alarming due to the increasing use of coal for energy and other purposes. Uzbekistan reduced its emissions by 1.47 tonnes from 2000 to 2023.

↓ Table 2. Changes in per capita CO_2 emission, 2000 vs 2023

	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
2000	3.63	9.41	0.93	0.36	8.61	4.95
2023	3.7	14.0	1.4	1.0	11.0	3.5
Change	0.04	4.57	0.50	0.65	2.42	-1.47

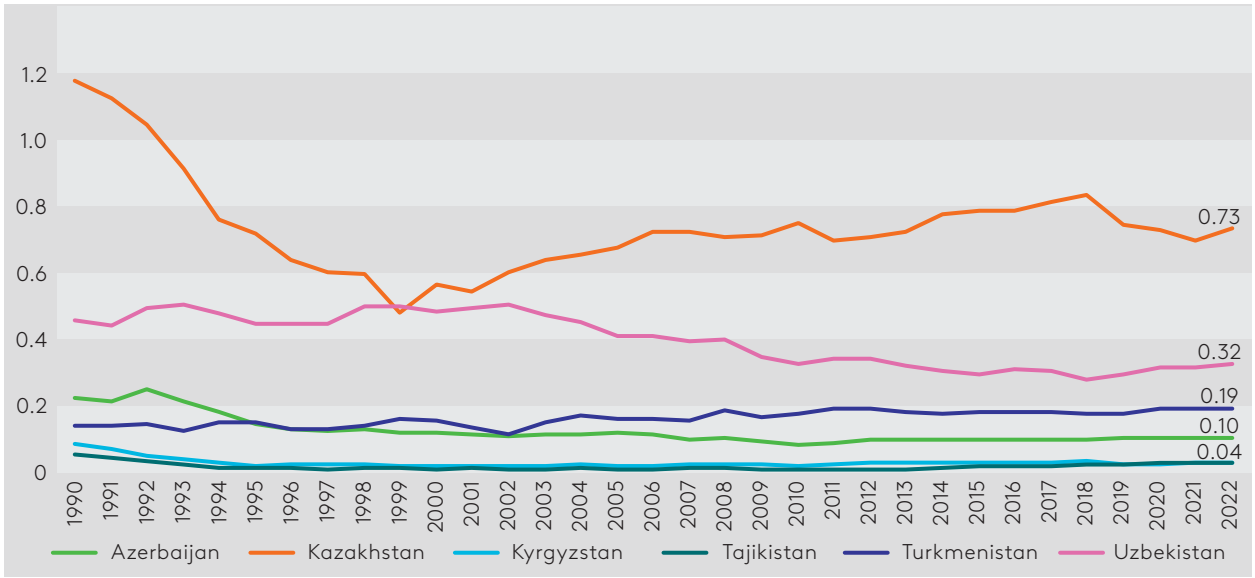
Source: Authors' calculations.

2.1 Emission Footprint in Central Asia and Azerbaijan

1.40%
the contribution of Central Asia and Azerbaijan to global GHG emissions in 2022

The contribution of Central Asia and Azerbaijan to global GHG emissions is very small, reaching 1.40% of global emissions in 2022. Kazakhstan produced the highest total emissions at 320 MT of CO_2, and 0.60% of the global share (2023). Uzbekistan finds itself in second place with a share of 0.41%, with Turkmenistan (0.19%) and Azerbaijan (0.12%) third and fourth, respectively. Kyrgyzstan and Tajikistan have the lowest share of emissions in the region, with a global share of each 0.04% (see Figure 3). Figure 3 indicates that Kazakhstan's emissions have grown steeply since 1999, when the figure was 0.48%, due to growth of emission-intensive technologies.

↓ Figure 3. Share of Global Emissions, 1990–2022, %

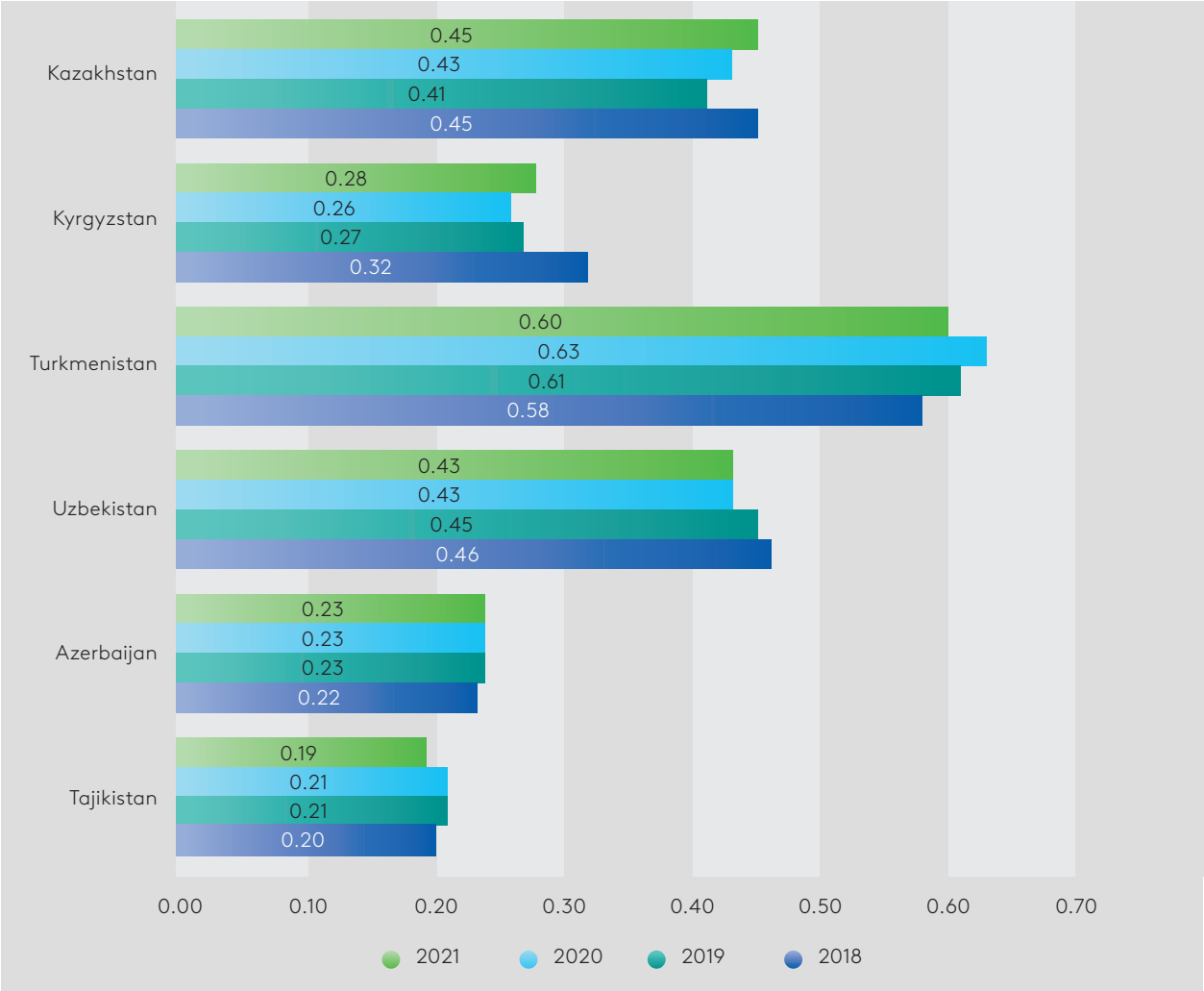


Source: IEA, 2024.

2.2 Carbon Intensity of GDP

Carbon dioxide emissions per unit of GDP[2], also known as carbon intensity, is a crucial indicator of a country's economic activity and environmental impact. Carbon intensity per unit of GDP indicates significant variations among the countries. It has declined for Azerbaijan, Turkmenistan, and Kazakhstan in the recent four years, which can be attributed to optimized combustion processes. Carbon emission intensity of GDP increased for Kyrgyzstan, Uzbekistan, and Turkmenistan for the same period.

↓ **Figure 4. Emission Intensity of GDP, 2018–2021, kg CO_2 per USD**



Source: SDG Indicator 9.4.1, UNECE, 2024.

[2] CO_2 emissions per unit of GDP are expressed in kilograms of CO_2 per USD constant 2010 PPP GDP.

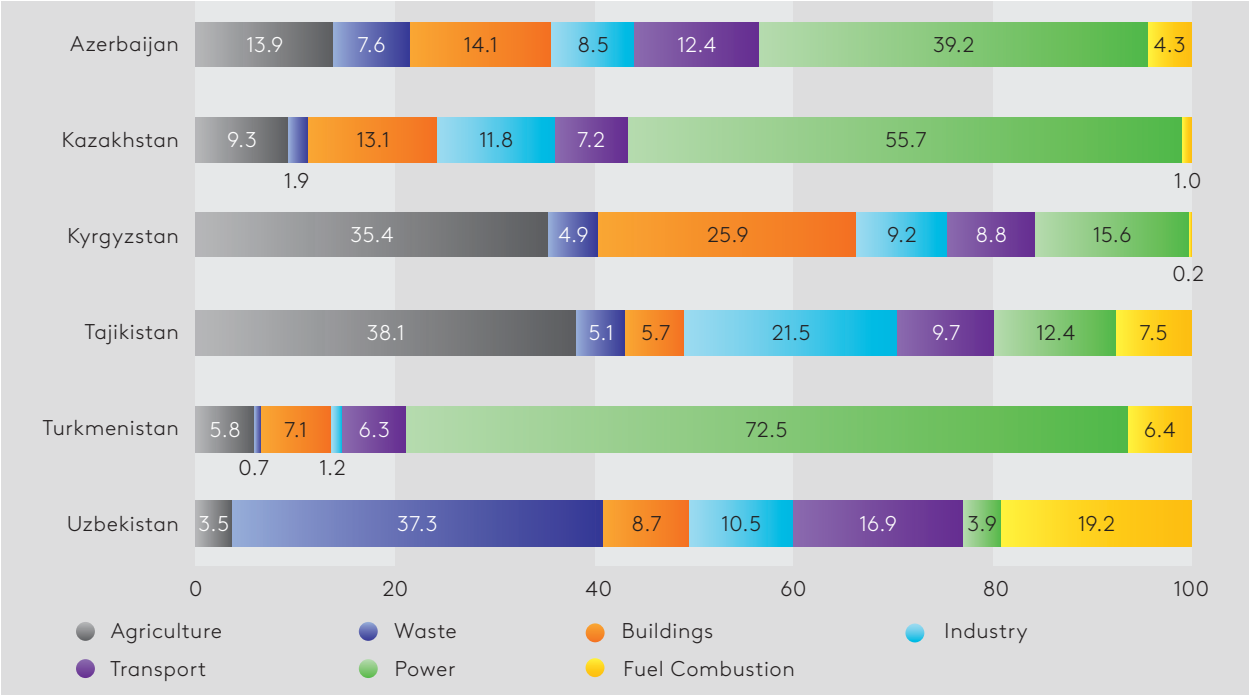
2.3 Sectoral Emissions in Central Asia and Azerbaijan

CO_2 emissions in the region are mainly from the following sectors: power industry[3], industrial processes[4] and buildings, agriculture, waste, and fuel exploitation[5]. The carbon intensive sectors in the region have increased particularly for power, which is a major source of GHG emissions and the largest contributor to the total emissions in all six countries. Kazakhstan has the highest share of emissions from the power sector, at 55.7 percent (164.7 Mt). Kazakhstan's second and third largest emissions-producing sectors are buildings and industrial processes, which together account for 34 Mt of CO_2 emissions. The agriculture and transport sectors accounted for 27 Mt of emissions in Kazakhstan for 2020. Turkmenistan is the second-largest emitter in the region (its power sector emitted 141.1 Mt), followed by Uzbekistan with power sector emissions of 70.1 Mt and agricultural sector emissions of 36.1 Mt, or 37.3 and 19.2 percent of total CO_2 emissions, respectively. Overall, the power sector in Central Asia's countries emitted 402.7 Mt of CO_2 in 2020; the power sector is followed by the agriculture sector, which accounts for 95.17 Mt of emissions . The lowest CO_2 emitting sectors are waste and fuel combustion (See Figure 5).

402.7 Mt
of CO_2 emitted by power sector in Central Asia's countries in 2020

95.17 Mt
of CO_2 emitted by agriculture sector in 2020

↓ Figure 5. Sector Emissions, %, 2020

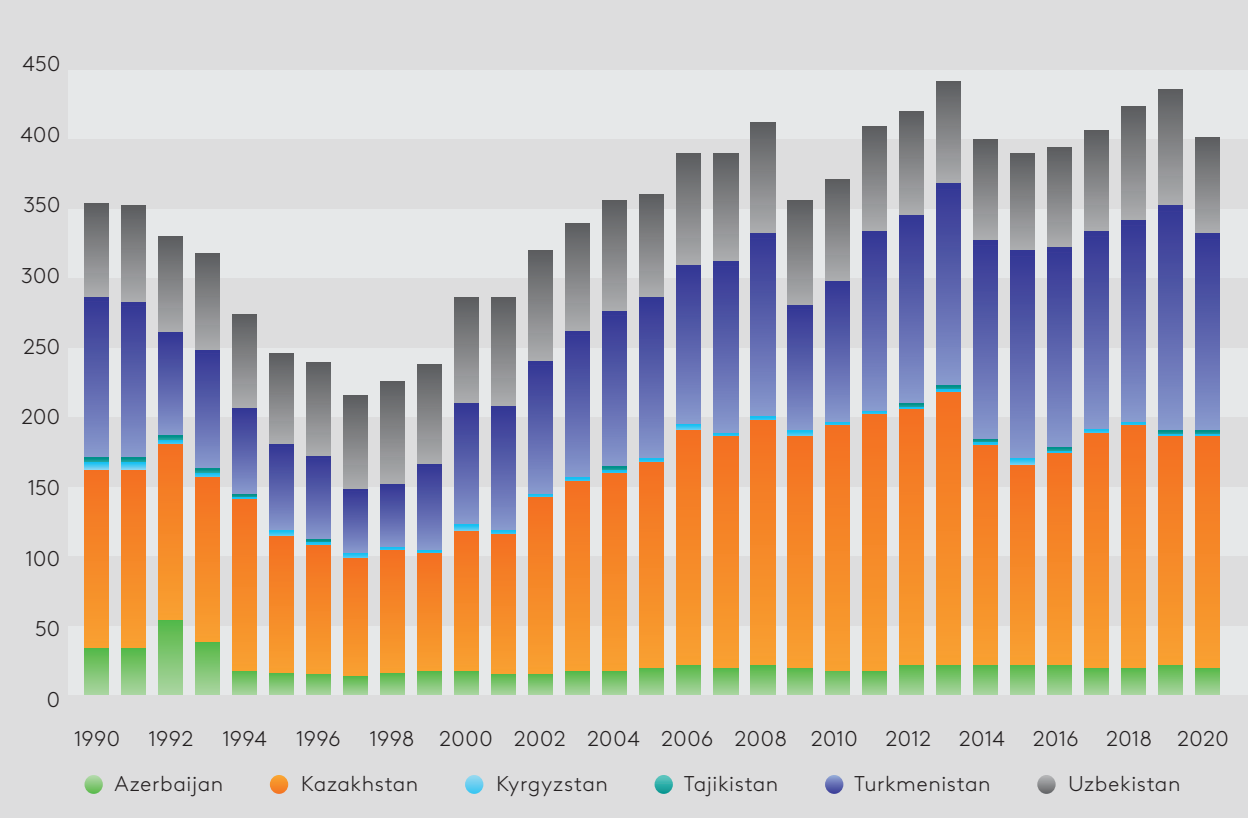


Source: Our World in Data, 2024.

[3] Power industry includes power and heat generation plants
[4] Industrial processes include combustion for industrial manufacturing and industrial process emissions
[5] Fuel exploitation: fuel extraction, transformation and refineries activities, including venting and flaring.

Kazakhstan, Turkmenistan, and Uzbekistan have the largest power sector carbon footprints among the Central Asian countries, while Kyrgyzstan, Tajikistan, and Azerbaijan have relatively low emissions from the power sector (see Figure 6).

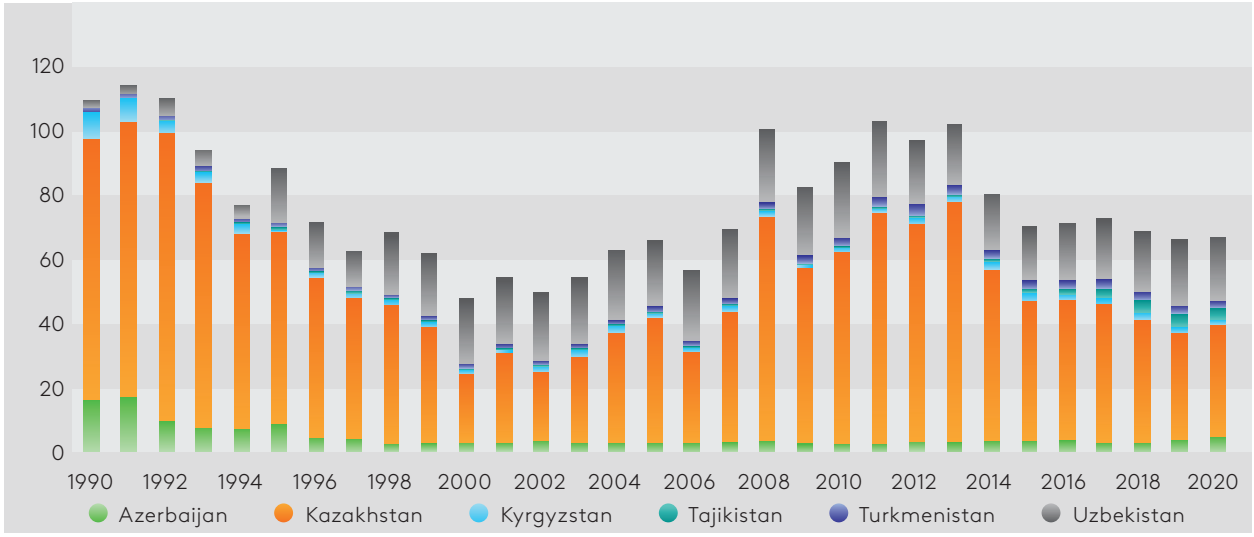
↓ Figure 6. Power Sector Emissions, 1990–2020, Mt CO_2



Source: IEA, 2024.

Industrial processes generate both emission of GHGs and pollutants, such as ammonia and mercury, which pollute water, air, and land, and are harmful to human health and the environment. In the Central Asian region, industrial emissions come from coal power plants, cement production, and gas exploitation. Figure 7 shows that Kazakhstan and Uzbekistan have a large footprint of industrial emissions, 34.82 and 19.67 Mt of $CO_{2,}$ respectively. Kazakhstan's industrial process emissions declined from 74.7 Mt in 2013 to 34.8 Mt in 2020. Overall, carbon emissions from industrial processes and production in Central Asia and Azerbaijan increased from 47.65 Mt in 2000 to about 66.82 Mt in 2020.

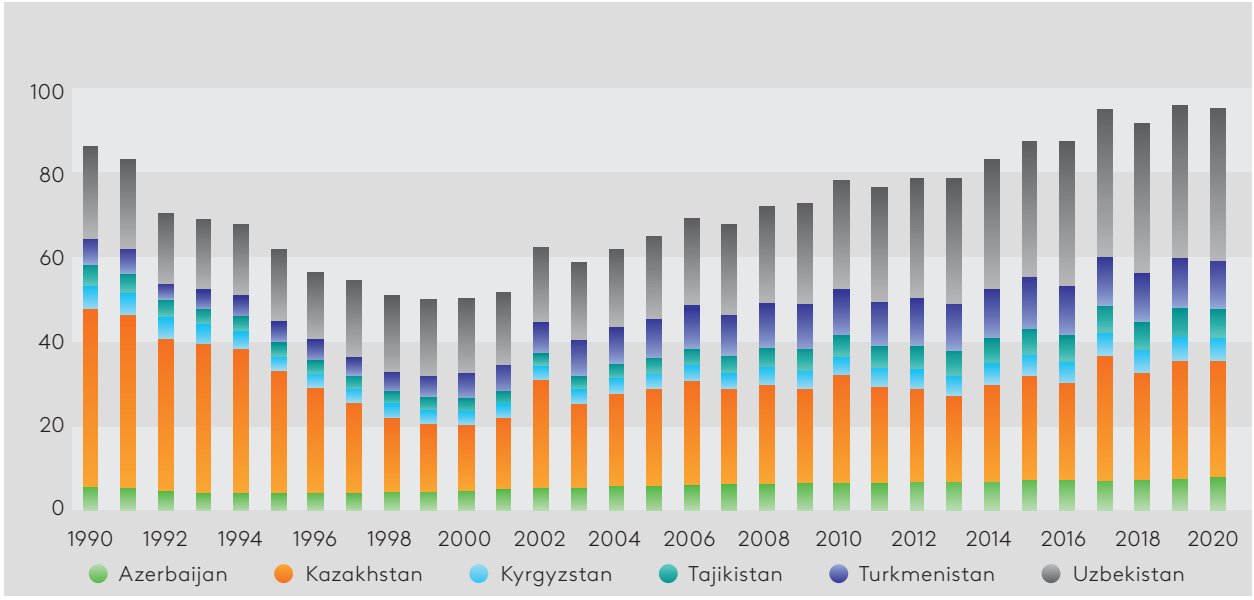
↓ **Figure 7. Industrial Process Emissions, 1990–2020, Mt CO_2**



Source: IEA, 2024.

Agricultural activities from crops and livestock production release significant amounts of GHGs such as carbon dioxide, methane, and nitrous oxide. Figure 8 depicts the share of emissions from agriculture, when the total emissions of the six countries from the agriculture sector is 95.17 Mt. Uzbekistan had the highest level of agriculture emissions in 2020 at 36 Mt, mainly due to growth in emissions from enteric fermentation from livestock. FAO data show an increase in the number of cattle, goats, and sheep by around 107%, 245%, and 58%, respectively (FAOSTAT, 2020). Uzbekistan is followed by Kazakhstan, which emitted 28 Mt of CO_2 from the agricultural sector. Kazakhstan's agricultural sector emission accounts for 9.1% of GHG emissions among other sectors.

↓ **Figure 8. Emissions from Agriculture**



Source: Climate Watch, 2024.

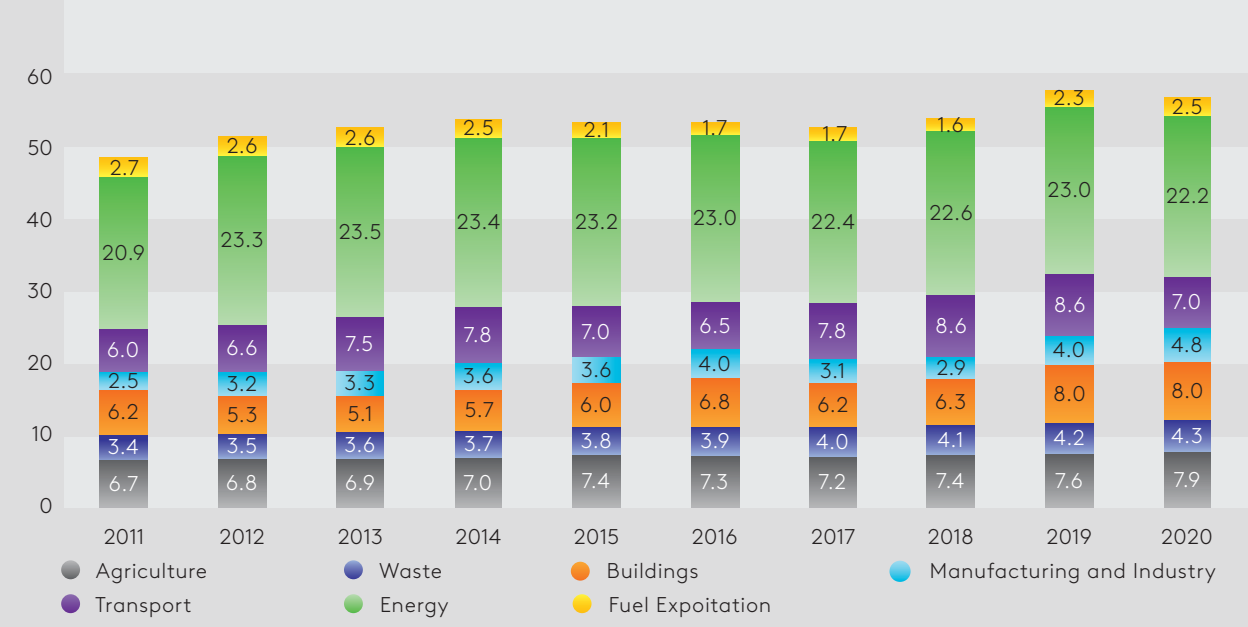
2.4 Country Level Analysis

Azerbaijan

Azerbaijan's share in global GHG emissions is 0.12%. According to the EU4Climate, Azerbaijan's emissions decreased between 1990 and 1995 by 37%, and remained at almost the same level in 2010. Figure 9 shows that since then, GHG emissions increased significantly. Azerbaijan committed in its earlier NDC to reduce 35% of GHG emissions by 2030 compared to 1999. Azerbaijan at COP 26 in 2021 announced a target of 40% GHG emission reduction by 2050 (UNFCCC, 2023) (for more information please refer to Chapter 3).

Figure 9 shows the sectoral emissions of CO_2 in Azerbaijan: the energy sector is the largest emitter of CO_2. In 2020, Azerbaijan's energy emissions were 39.2% (22.2 CO_2 million tonnes) of total emissions; the energy sector is followed by the agriculture and construction sectors. Azerbaijan's waste and manufacturing and industrial sectors are the lowest emission producers.

↓ **Figure 9. Azerbaijan's Sectoral Emissions, 2011–2020, Mt CO_2**



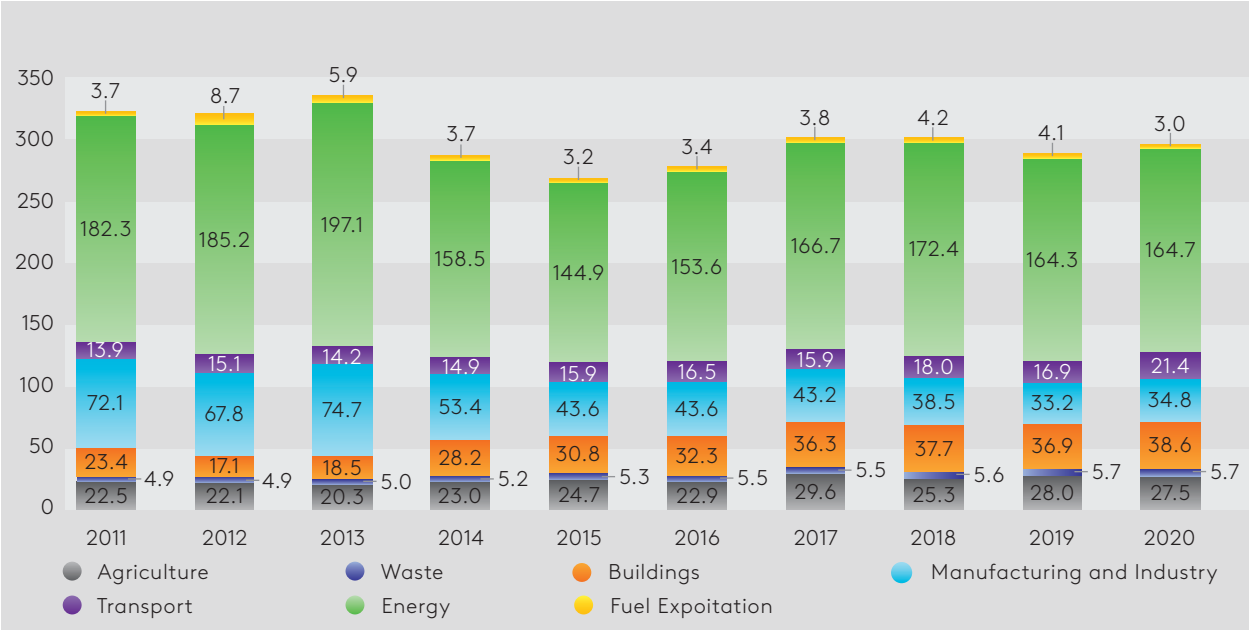
Source: IEA, 2024.

Kazakhstan

Kazakhstan's CO_2 emissions were recorded at 245 million tonnes in 2022, whereas its global share of emissions is 0.61%. Kazakhstan's government committed in its revised NDC to a 25% reduction in emissions by 2030, compared to 1990 levels, conditional on international support, while committed to an unconditional emissions reduction target of 15% by 2030, compared to 1990 levels (UNFCCC, 2023) (for more information please refer to Chapter 3).

Figure 10 shows that the vast majority of CO_2 emissions come from the energy sector by burning fossil fuels: coal, oil, and natural gas for power generation or to fuel vehicles and other machines. The energy sector is followed by buildings and manufacturing and industrial processes that use fossil fuels to produce heat for industrial processes such as making paper or steel. The lowest emission sectors are waste and fuel exploitation.

↓ **Figure 10. Kazakhstan's Sectoral Emissions, 2011–2020, Mt CO_2**



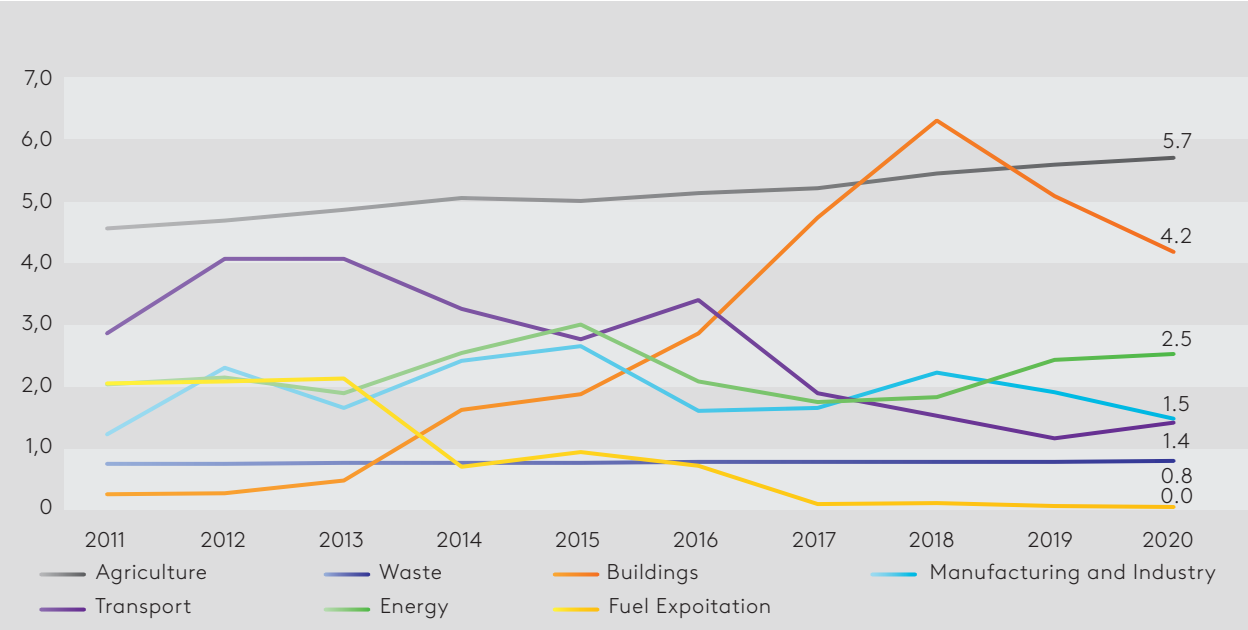
Source: IEA, 2024.

Kyrgyzstan

Kyrgyzstan is a relatively small emitter of GHGs; CO_2 emissions were 10 million tonnes in 2022. In terms of GHG emissions, Kyrgyzstan is the 137th country in the world, with a total share in global emissions of 0.03%. Kyrgyzstan submitted a revised NDC in 2021, which committed to a 36.61 percent conditional emissions reduction by 2025 and 43.62 percent by 2030, compared to business as usual. The country also committed to an unconditional emissions reduction of 16.63% by 2025 and 15.97% by 2030, compared to business as usual (UNFCCC, 2021) (for more information please refer to Chapter 3).

Figure 11 shows that agriculture is the only sector with constantly growing emissions in Kyrgyzstan (5.7 million tonnes of CO_2), which is 35.4% of total emissions. The agriculture sector's emissions are followed by buildings and energy sector emissions (25% and 15%).

↓ **Figure 11. Kyrgyzstan's Sectoral Emissions, 2011–2020, Mt CO_2**



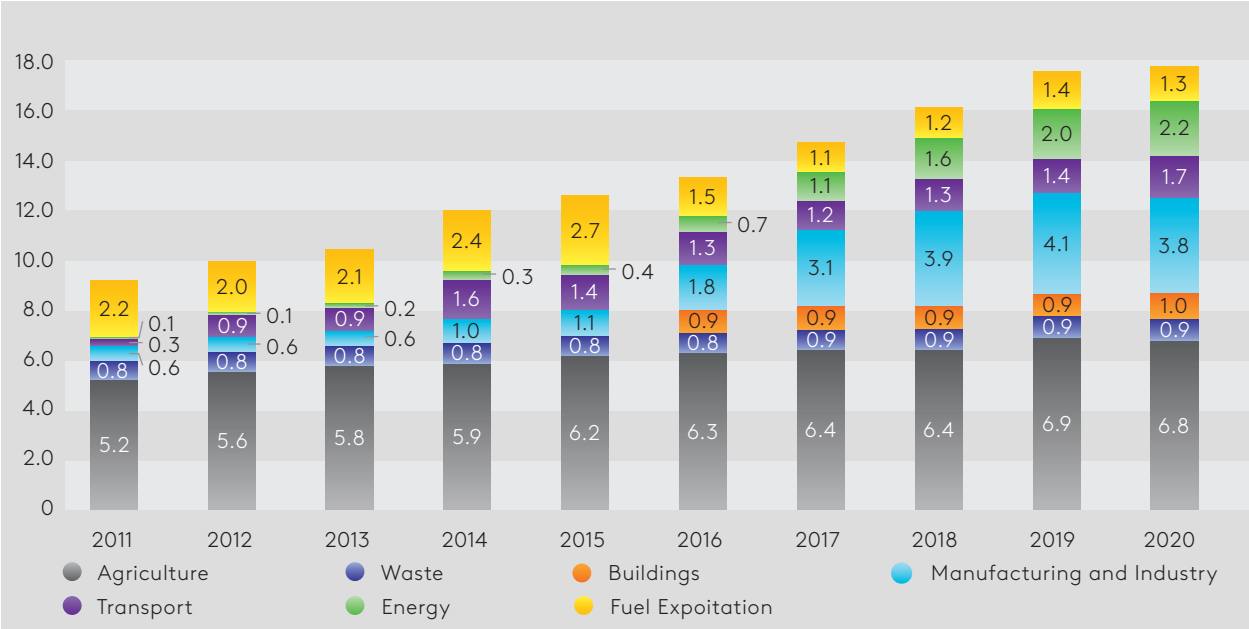
Source: IEA, 2024.

Tajikistan

Tajikistan is a relatively small emitter of GHGs; CO_2 emissions were 10.5 million tonnes in 2022. With a total share in global emissions of 0.04%, Tajikistan was ranked 102nd out of 187 by the ND-GAIN Country climate vulnerability index in 2022 (ND-GAIN, 2022). Tajikistan submitted its revised NDC in 2021 and committed to reducing its emissions by 40–50% by 2030 compared to 1990 levels. Tajikistan also set an unconditional emissions reduction target of 30–40% by 2030 compared to 1990 levels (UNFCCC, 2022) (for more information please refer to Chapter 3).

Figure 12 shows that emissions in Tajikistan are growing. Large quantity of emissions come from the agriculture sector, which was responsible of 38.1% of emissions in 2020. The agricultural sector was followed by manufacturing and energy (21.5% and 12.4%).

↓ Figure 12. Tajikistan's Sectoral Emissions, 2011–2020, Mt CO_2



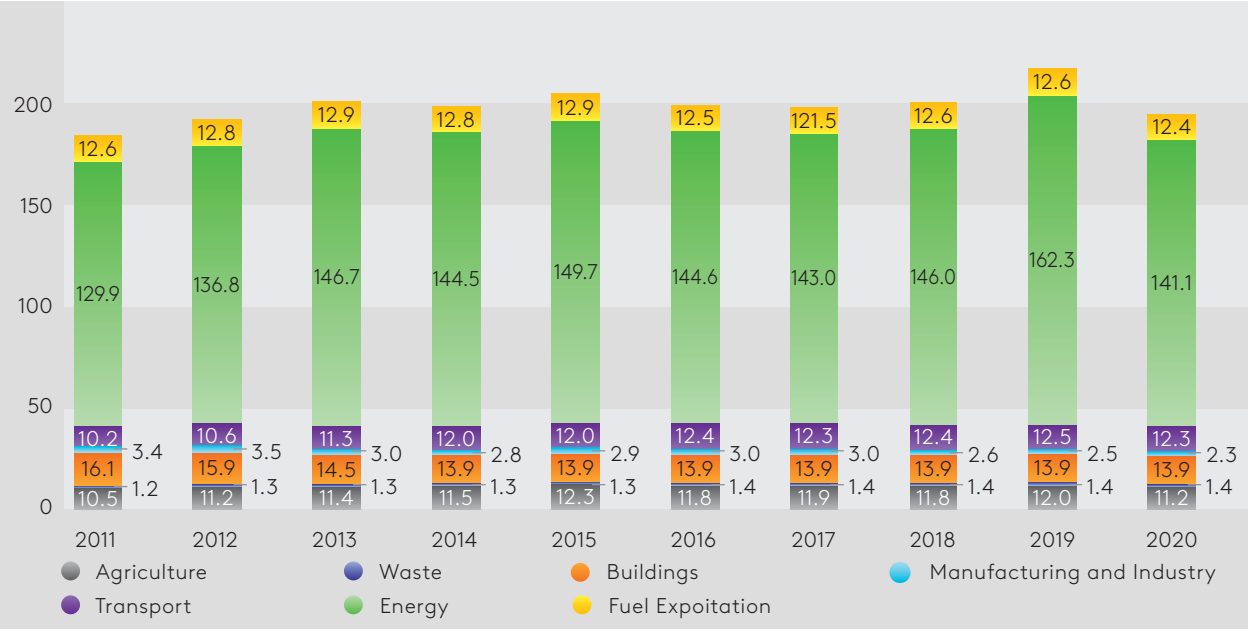
Source: IEA, 2024.

Turkmenistan

Turkmenistan emitted 69.8 million tonnes of CO_2 in 2022, with a total share of 0.41%. Turkmenistan is recognized as vulnerable to climate change, ranked 124th out of 187 countries in the 2022 ND-GAIN Index (ND-GAIN, 2022). Turkmenistan submitted its revised NDC in 2023 and committed to reducing its emissions by 20% by 2030, compared to 2010 levels under a business-as-usual scenario (UNFCCC, 2022) (for more information please refer to Chapter 3).

Figure 13 indicates that the energy sector is responsible for the majority of GHG emissions. The energy sector produced 72.5 percent of CO_2 emissions in 2020 via the burning of fossil fuels such as coal, oil, and natural gas for power generation or to fuel vehicles and other machines. Turkmenistan is known for having the largest volume of methane emissions from oil and gas operations in the region.

↓ **Figure 13. Turkmenistan's Sectoral Emissions, 2011–2020, Mt CO_2**



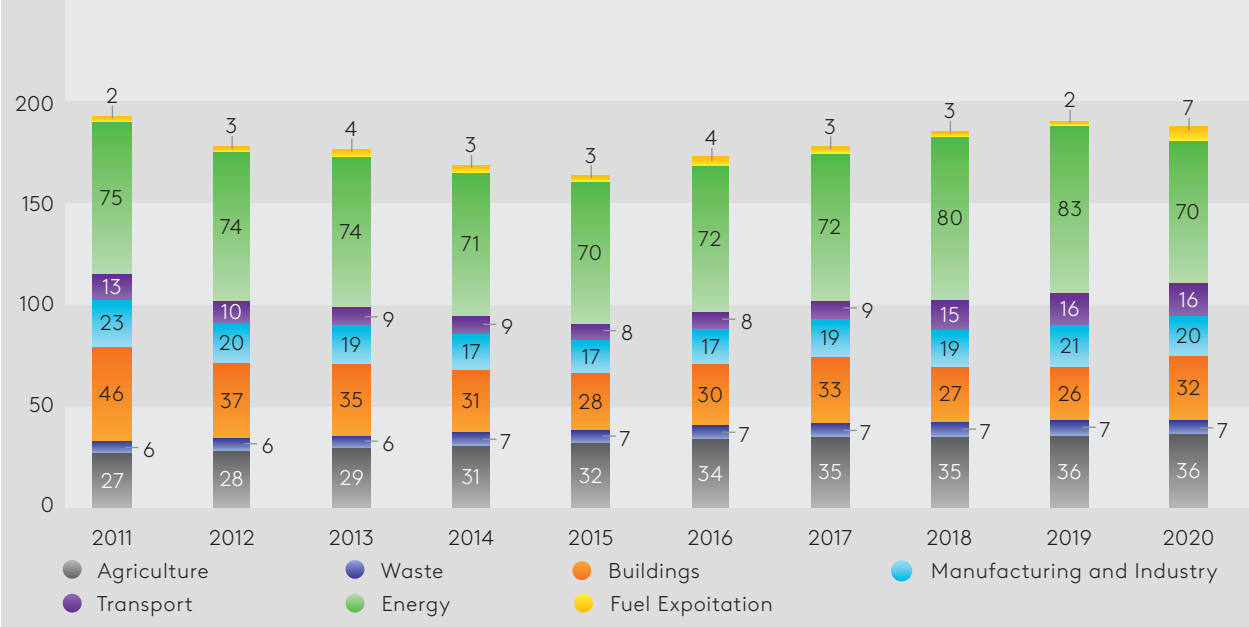
Source: IEA, 2024.

Uzbekistan

Uzbekistan emitted 132 million tonnes of CO_2 in 2022, with a global share of 0.39%. Uzbekistan submitted its revised NDC in 2021 and committed to reducing specific greenhouse gas emissions per unit of GDP by 35% below 2010 levels by 2030 (UNFCCC, 2021) (please refer to Chapter 3 for more information).

Figure 14 shows that the energy sector is responsible for the majority of GHG emissions. The CO_2 emissions in the energy sector were a total of 37.3 percent via the burning of fossil fuels such as coal, oil, and natural gas for power generation or to fuel vehicles and other machines. The energy sector is followed by agriculture, building, and industrial processes (19.2%, 16.9% and 10.5%, respectively).

↓ **Figure 14. Uzbekistan's Sectoral Emissions, 2011–2020, Mt CO_2**



Source: IEA, 2024.

3. Climate Policies in the Selected Countries

There is growing political, economic, and institutional concern about addressing climate change, which was previously an exclusive duty of environmental agencies and hydrometeorological services. Ministries of Finance, Energy, Economy and Foreign Affairs are becoming new partners in planning and implementing measures for climate change mitigation and adaptation, and clean energy transition. Successful implementation of the 2015 Paris Agreement, which aims to keep the increase in global average temperature below 2°C above pre-industrial levels, depends on many actors at the national and international levels. The countries of Central Asia (CA) and Azerbaijan started to actively integrate vital climate issues into their public policies at the same time as the rest of the world, and are now in many ways keeping pace.

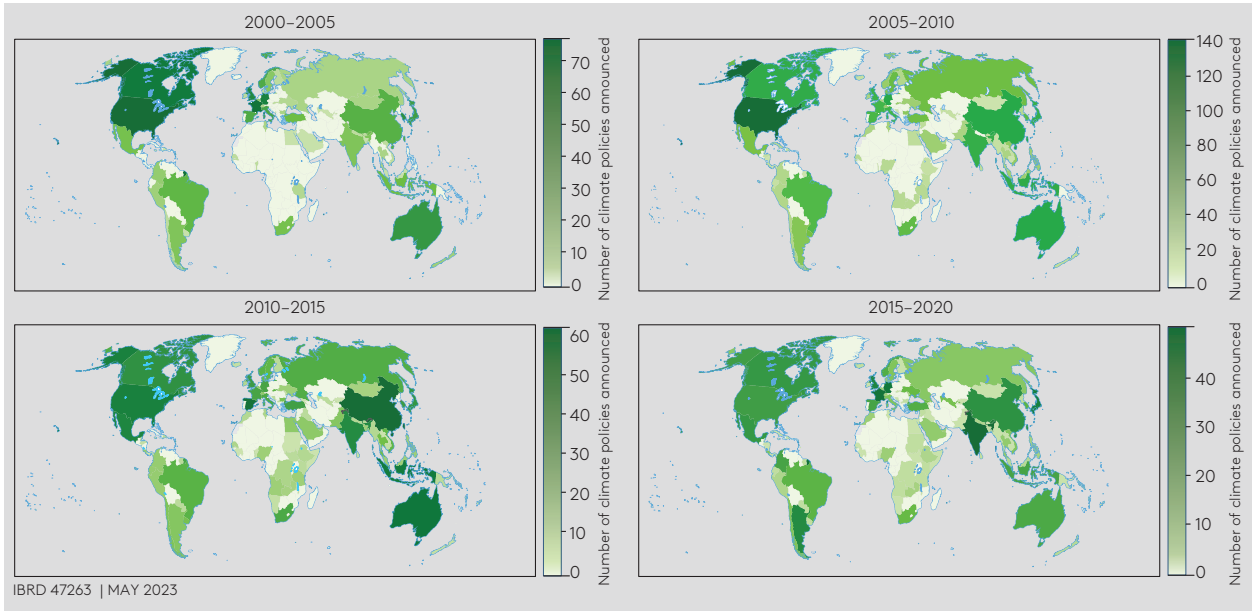
over 4,500
climate policies have been implemented by various countries in the last 30 years (World Bank, 2023)

Recognizing the importance and nature of climate change and the need to address it, countries are increasingly expanding the scope of climate policies, the instruments designed to reduce GHG emissions. Often announcements of such developments are coupled with major international events and reflect public commitments to a larger global goal. According to the Climate Policy Database, over 4,500 climate policies have been implemented by various countries in the last 30 years (Figure 15) (World Bank, 2023). The UNFCCC COP events held in Copenhagen in 2009 and in Paris in 2015 played a significant role in the adoption of these policies, despite a decline in the number of policies announced in subsequent years. This is particularly relevant for upper-middle-income countries[6]: 2005–2015 saw a peak in the adoption of new policies and commitments, when developing countries were at the same level as developed countries in terms of inclusion in the climate agenda.

National climate objectives may be similar, but they can vary in terms of their coverage, level of binding commitment, conditions, and timeframe. This variability allows alignment with nations' climate strategies and establishment of worldwide targets that each nation can tailor to its unique circumstances and priorities. Nonetheless, differences in individual development strategies and sectoral policies can be considerable, depending on factors such as socio-economic conditions, level of development, the country's impact on climate change, exposure to climate-related risks, attitude towards other competing priorities and political will to put climate issues in focus.

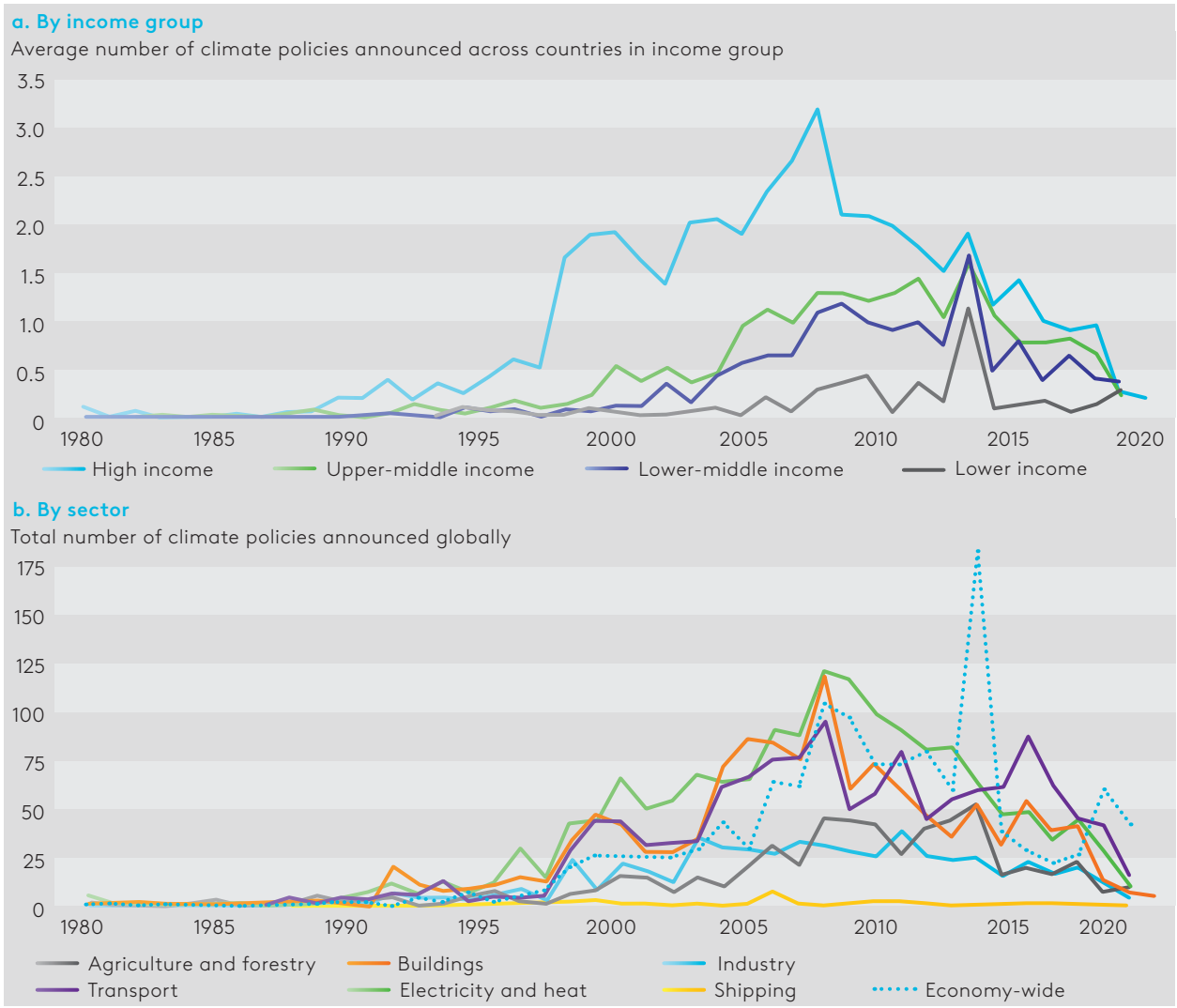
[6] World Bank country classification by income level is based on the gross national income (GNI) per capita.

↓ Figure 15. Climate Policy Announcements Over Time and Space



Source: World Bank, 2023.

↓ Figure 16. Climate Policy Announcements, by Country Income Group and by Sector



Source: World Bank, 2023.

This chapter elaborates on the key mechanisms and instruments of climate regulation in the selected countries, as well as sources of climate finance and target areas for their expenditure. The countries of Central Asia and Azerbaijan differ in both their governance approaches and climate-related priorities, as will be clearly demonstrated later.

These countries are following the pace of developed countries and joining international agreements, such as Cancun pledge pre-2020, Kyoto Protocol, Paris Agreement, Global Methane Pledge, etc., by tailoring provisions of international commitments and best practices to national needs and conditions. The countries joined this movement at their own pace, but now all of them have updated their Nationally Determined Contributions (NDCs). Each country has an almost complete package of documents: climate and environmental issues are reflected in the medium- and long-term development strategies, and separate climate and energy sector development strategies prioritizing transition to low-carbon energy sources are being developed. Kazakhstan, the largest emitter of CO_2 in the region, is the only country to form a long-term strategy of carbon neutrality, significantly raising the stakes in the implementation of climate policy. There is a common understanding that the countries will contribute to climate action through modernization and low-carbon solutions in the energy and transport sectors.

In addition, joint political efforts are being made within the Eurasian Economic Union (EAEU) by the inter-ministerial High-Level Working Group formed to develop proposals for the convergence between EAEU member states within the framework of the climate agenda (Eurasian Economic Commission, 2025). As part of the most significant recent achievements of this high-level political dialogue between the EAEU member states (Kazakhstan and Kyrgyzstan are among them), the document "Approaches to Regulating the Climate Agenda within the EAEU" was signed in June 2024 (Ministry of Economic Development of Russia, 2024), in which the parties agreed on the joint development of voluntary interstate climate-related standards, and the creation of a register of Eurasian validators and verifiers for carbon regulation. The parties also agreed than national carbon regulation should not create barriers in the internal market of the EAEU, and decided to work on common standards for joint climate projects. Supranational support could help to enhance regional competencies, especially by sharing regional experience and successful measures, as well as spreading low-carbon technologies in the region (Podguzov, 2023).

In view of the energy scarcity problem, which is an issue in almost all of the countries reviewed, their governments prioritize environmental conservation and technological modernization measures, and are much more reticent about fiscal measures for carbon-intensive activities. Although every policy document claims high renewable energy sources (RES) potential, government support for traditional fossil fuels through subsidizing energy tariffs is preventing RES from gaining a foothold in the market.

At the same time, many of the countries within the scope are resource-based and fossil fuel-dependent economies. For them, the issue of adapting their economies to the current international climate agenda is key to remaining competitive in the long term.

Azerbaijan

Given that Azerbaijan's economy is natural resource-oriented and the main source of export revenues is related to fossil fuel extraction, Azerbaijan boasts one of the highest energy self-sufficiency ratios in the world, surpassing demand by nearly fourfold. In the long run, the reliance on oil for fiscal purposes necessitates careful examination. Projections indicate that the proven reserves of oil and gas in Azerbaijan will have a shorter duration than those of Iran, Saudi Arabia, or Kazakhstan. These factors advocate for diversification of development routes for the country, as well as requires attention to climate-related issues (President of the Republic of Azerbaijan, 2016).

by 40%
reduction of GHG emissions by 2050 compared to 1990 levels, subject to international finance support (Azerbaijan's commitment)

Azerbaijan was among the first nations to draft commitments during the COP21 held in Paris in 2015, presented in the format of Intended Nationally Determined Contributions. These contributions collectively laid the foundation for the Paris Climate Agreement. This was followed by the initial **Nationally Determined Contribution (NDC)** in 2017, with its revised version receiving approval in 2023. This action solidified the nation's commitment:

- To reduce greenhouse gas (GHG) emissions by 40% from the levels of 1990 by the year 2050, subject to international finance support.

According to the **Socio-Economic Development Strategy of the Republic of Azerbaijan for 2022–2026** (President of the Republic of Azerbaijan, 2022), the country's climate-related priorities lie in:

- Development and expansion of renewable energy sources, use of green technological solutions and transport on alternative energy sources;

- Environment-friendly industrialization, effective waste management system, biodiversity preservation, water bio-resource enhancement and aquaculture protection.

The **Azerbaijan 2030: National Priorities for Socio-Economic Development program** (President of the Republic of Azerbaijan, 2021) endorses renewable energy and energy efficiency technologies as priorities in climate change mitigation. It also states that non-oil sector growth will ensure Azerbaijan's economic resilience in the face of global decarbonization, as well as promote expanding investment activity in the industrial

sector, improving the business environment in this area, and creating new production and service enterprises in the non-oil sector.

The program was preceded by the development concept "**Azerbaijan 2020: Looking into the Future**" that was adopted in 2012. The primary themes of the concept encompassed actions aimed at conserving biodiversity, mitigating the adverse effects of the fuel and energy sector on the environment, addressing sea pollution, protecting water bodies, restoring green spaces, and efficiently safeguarding existing resources. The concept emphasized the necessity of aligning the energy consumption and carbon dioxide emissions required to generate one unit of GDP in Azerbaijan with the relevant benchmark of the Organisation for Economic Co-operation and Development nations within the specified timeframe outlined in the concept document. This alignment was deemed crucial for advancing the Millennium Development Goals, eight development goals set by the 189 UN member states in 2000 and superseded by the Sustainable Development Goals in 2015.

In general, climate-related regulations focus on mitigation goals and do not incorporate adaptation to their programs. Azerbaijan's goal is not only general economic growth, but especially "green" growth by means of increasing the RES share in sovereign energy supply. According to the 2022–2026 Development Strategy, the share of RES is to reach 24% of total energy capacity by the end of the period.

24%

the targeted share of RES in total energy capacity of Azerbaijan by the end of 2026

To ensure that, the **Law on Use of Renewable Energy Sources in the Generation of Electricity** (Ministry of Energy of the Republic of Azerbaijan, 2021) was adopted in 2021. The major means of supporting new renewable energy capacity creation are: fixed tariffs for renewable electricity, support for consumers and support for research and development, and fiscal support measures. The Decree "On Acceleration of Reforms in the Energy Sector of the Republic of Azerbaijan" of 29 May 2019 (President of the Republic of Azerbaijan, 2019) affirms energy sector liberalization as a core principle of further sectoral development, which also contributes to further RES incorporation into Azerbaijan's energy system.

The country does not have a **Zero Emissions Development Strategy**, but it is said to be under development as of 2024 (Sputnik Azerbaijan, 2024). The strategy is expected to cover a broad range of measures from reducing the country's methane emissions to incentivizing the private sector to participate in green projects, issuing green credits and introducing a carbon tax.

State-owned enterprises and specialized organizations are significant actors in the execution of climate strategies within a nation. For instance, the State Oil Company of Azerbaijan (SOCAR) and Azerenergy OJSC, working in collaboration with the

Azerbaijan National Academy of Sciences, has been assigned responsibilities related to contributing to the formulation of the State Low Carbon Development Program, conducting emissions inventories, and creating and executing the Monitoring, Reporting, and Verification (MRV) framework (President of the Republic of Azerbaijan, 2022).

Kazakhstan

50%

of demand could be the deficit of water resources in Kazakhstan by 2040, according to UNDP forecast

Kazakhstan is the biggest country in Central Asia and like other CA countries is vulnerable to climate change impacts. About 90% of Kazakhstan's territory belongs to an arid climate zone with low humidity and limited water resources: water availability is estimated at 20,000 m^3 per km and is the lowest in Eurasia. According to a UNDP forecast, by 2040 Kazakhstan may face a significant deficit of water resources in the amount of 50% of demand. Since almost all sectors of the economy depend on water, GDP could fall by 6 percent by 2050 due to water scarcity in some regions (UNDP, 2021). The consequences of climate change are already causing ever-increasing human, financial, and environmental losses, negatively affecting food security and poverty levels, and hindering the sustainable development of the country.

Kazakhstan started its climate path from signing UNFCCC in 1992, signing and ratifying the Kyoto Protocol on adoption of voluntary quantitative commitments to reduce anthropogenic emissions of greenhouse gases in 2009 (UN, 1992). In 2010, Kazakhstan joined the Cancun pre-2020 pledge, submitting its first economy-wide emission target for 2020: to reduce 15% of base value in 1992 (UNFCCC, 2010). Following the global movement, Kazakhstan set its **first NDC** in 2016 (UNFCCC, 2016) and revised it in 2023 (UNFCCC, 2023). Kazakhstan committed:

- To reduce GHG emissions by 15% by the end of 2030 relative to the 1990 base year (unconditional target);

- To reduce GHG emissions by 25% by the end of 2030 relative to the 1990 base year, subject to significant additional international investments and significant grant assistance; access to an international technology transfer mechanism; co-financing and participation in international research projects, development of promising low-carbon technologies and initiatives to build local expertise (conditional target).

The revised NDC provided for not only setting more ambitious targets, but also enhancing the national emission trading system and implementing measures on

adaptation to climate change. That updated NDC enshrines a **net zero target by 2060** and determines long-term goals: to reduce the energy intensity of GDP from the 2008 level by 50% by 2050, and to increase the share of alternative sources in electricity generation to 15% by 2030 and 50% by 2050, respectively.

Following the signing of the Paris agreement in 2015, climate change plans have been reflected in a number of key strategies, policies and concepts.

50%
reduction in the energy intensity of GDP compared to 2008 level by 2050, and

50%
share of alternative sources in electricity generation by 2050 (Kazakhstan)

Kazakhstan was the first country in Central Asia to create a legal framework for the transition to "green growth" through adoption of the **Concept for the transition of the Republic of Kazakhstan to a Green Economy** in 2013 (President of the Republic of Kazakhstan, 2013). It focuses on setting the groundwork for deep systemic transition to a green economy, improving the welfare and quality of life of the population, while minimizing the footprint on the environment and degradation of natural resources. The concept sets quantitative and qualitative targets for six main areas of "green economy": water resources, agriculture, energy efficiency, power industry, air pollution, and waste management. The priorities outlined in the Concept build linkages between national security, effective resource management, and modernization of infrastructure. The **Action Plan** for implementation of the Concept focuses on necessary measures on reduction of GHG emissions in the energy sector by improvement of energy efficiency, development of sustainable transport and infrastructure for electric and gas vehicles (Government of the Republic of Kazakhstan, 2020).

Strategy of Kazakhstan 2050 was announced by the President in 2012 together with a developed Strategic Plan 2025 that is built around seven major systemic reforms and seven priority policies for the country's economy and social life (President of the Republic of Kazakhstan, 2012). One of the reforms is "Green economy and environmental protection". Among other impacts, the green technology shift is expected to contribute to the country's energy saving goals, not least via applying of modern standards, improving energy efficiency, and reducing operating costs of power-generating plants. The concept highlights green finance market development in order to mobilize funding for green projects. The **National Development Plan of the Republic of Kazakhstan until 2025** enhances these measures by adding new sources of electricity generation, such as renewable energy installations (President of the Republic of Kazakhstan, 2018). It states that the amount of renewable energy would double in five years with the establishment of 13 hydroelectric plants, 34 wind farms, and 12 solar energy plants. The **Plan of the Republic of Kazakhstan on Development until 2029** focuses on modernizing energy infrastructure, increasing the share of renewable energy sources, and improving the investment attractiveness of the sector, without quantitative goals.

Being announced in 2020 as a core climate policy document, **Carbon Neutrality Strategy until 2060** was adopted in 2023 and outlines a comprehensive plan to reduce carbon emissions, promote low-carbon development, and encourage the adoption of renewable energy sources (President of the Republic of Kazakhstan, 2023). The Strategy sets indicative emissions thresholds for each decade until the end of the specified period. It also outlines the funding needed — US$10 billion through 2030, with the remaining US$600 billion to be invested by the end of 2060. Thus, the decarbonization price is estimated at $65.4 per t CO_2e. The Strategy provides for establishment of a carbon regulation system that would include both ETS and carbon taxation. A corresponding roadmap for implementation of the Strategy until 2060 is under development.

$610 billion
funding needed of achieve the targets of Kazakhstan's Carbon Neutrality Strategy until 2060

The Environmental Code acts as an institutional framework for reducing GHG emissions (Government of the Republic of Kazakhstan, 2021). It was the first to foresee market mechanisms for GHG emissions regulation in 2013 — the ETS aiming at annual emissions reduction of 1.5% until 2030. The Environmental Code also ensures the achievement of the NDC. Considering commitments under the Paris Agreement and the updated NDC, the Environmental Code now also includes approaches to climate change adaptation in four priority sectors: agriculture, aquaculture, forestry, and civil defense.

Kazakhstan's Green Taxonomy, approved in 2021, identifies the basic criteria for classifying investment as green (Government of the Republic of Kazakhstan, 2021). This univocal definition enshrines priority areas to coordinate not only state programs, but also private finance via raising its attractiveness. Identifying green projects fosters transition to green growth, development of sustainable tools and green financing, and mainstream implementation of ecological, social, and corporative management principles.

Other policies include legislation and strategic plans of corresponding Ministries on climate actions, such as Investment Policy until 2026 (Government of the Republic of Kazakhstan, 2022), Law on Supporting the Use of Renewable Energy Sources (Parliament of the Republic of Kazakhstan, 2009) or the Law on "Energy Saving and Increase of Energy Efficiency" (Parliament of the Republic of Kazakhstan, 2012).

As stated in the country's decarbonization policies and updated NDC, the development of renewable energy sources is key to achieving these goals: reducing emissions, and managing resources more efficiently. The country has so far increased the share of RES in energy generation from 0.6% in 2015 to 5.9% in 2023 and 6.5% for 6 m-2024 (Ministry of Energy of the Republic of Kazakhstan, 2024). According to some experts, reaching 15% RES by 2030 is challenging due to problems including

unstable supply of RES facilities, lack of raw materials for RES industry, absence of balancing energy supply that could allow quickly switching to fossil fuel energy sources if needed. Moreover, the tariffs on renewable energy are not high enough to ensure an acceptable return on investments (Capital Business Information Center, 2024; Parliament of the Republic of Kazakhstan, 2009).

In order to enhance the attractiveness of low-carbon solutions, promote transition to renewable energy sources, and align with Paris agreement obligations, the ETS was launched as a pilot project in Kazakhstan in 2013, but the carbon units were introduced economy-wide on the Caspi Commodity Exchange (CCE) only in 2015. Kazakhstan chose this system as one of the Kyoto Protocol market mechanisms for preventing global climate change that is widely used by many countries that are participants of the UNFCCC. ETS is applicable only to one greenhouse gas — CO_2 — out of seven regulated by the Kyoto Protocol, and covers 43% of all GHG emissions of the national economy.

Kyrgyzstan

Kyrgyzstan is vulnerable to climate change impacts, ranging from the melting of glaciers to the deterioration of air quality, and subsequently impacting the well-being and health of population. The environmental and climate-related issues in Kyrgyzstan present a risk to the country's sustainable development in the future, notably including the depletion of natural resources and the degradation of vital natural ecosystems. At the same time, Kyrgyzstan has favorable national circumstances to establish leadership in a green economy, given the predominant role of hydropower in the energy supply structure.

Kyrgyzstan's engagement in the global climate agenda started with the Cancun pledge pre-2020, which stood for a one-time-only economy-wide emission reduction target for the period up to 2020. This was followed with the 2015 INDC target and in 2020 the first NDC target. In 2021, Kyrgyzstan revised its **NDC** with two targets being set (UNFCCC, 2021):

- To reduce its GHG emissions by **16.63%** by 2025 and by **15.97%** by 2030 compared to BAU (business-as-usual scenario) (unconditional);

- To reduce its GHG emissions by **36.61%** by 2025 and by **43.62%** by 2030 compared to BAU (conditional to international finance support).

Priority sectors for climate mitigation are defined in the NDC according to their mitigation capacities as follows:

- Energy sector: to develop RES, to improve energy efficiency, to expand the natural gas network, to introduce electric vehicles;

- Agriculture sector: to reduce the livestock headcount, increase productivity, and improve the pedigree stock; to expand the area of cultivated organic crop farming lands; to increase the efficiency of manure as a fertilizer and generation of biogas;

- Forestry and Other Land Uses sector: to preserve and increase the area of forests, to expand perennial plantations.

$10 billion
potential mitigation and adaptation costs for Kyrgyzstan

63%
of which is sought in the form of international financial assistance.

Regarding adaptation, Kyrgyzstan considers actions in water resources and agriculture, energy, emergency services, public health, forest and biodiversity, as well as in new intersectoral topics: climate-resilient areas and green cities. While assessing potential mitigation and adaptation costs, Kyrgyzstan reports an estimated $10 billion, 63% of which is sought in the form of international financial assistance.

The National Development Strategy of the Kyrgyz Republic for 2018–2040 outlines measures to ensure environmental safety through preservation of natural ecosystems (Government of the Kyrgyz Republic, 2018). The enlargement of green planting areas is viewed as a crucial factor in decreasing and possibly reaching negative (below zero) carbon dioxide emissions[7]. This endeavor is anticipated to transform the country into the most environmentally friendly economy within the region. The Strategy highlights the role of adaptation measures for sustainable growth, where effective planning and management of country transition to sustainable development play crucial roles. With regard to the energy sector, measures to increase electricity tariffs and to apply energy-efficient technologies are mentioned. The Strategy provides for economically efficient solutions in the transport sector that will reduce the amount of pollutants and GHG emissions, without providing much in the way of details.

Regarding economic measures to support further development, the Strategy highlights the intention not to burden business with taxation that would not exceed 20% since 2020, including social contributions, and would be reduced to two taxes, the turnover tax and the income tax. In development finance, a great role is attributed to the domestic financial market, expanding the possibilities of borrowing in the domestic market and lowering dependence on "donor" financial support.

[7] A carbon negative economy absorbs more CO_2 emissions than it emits. The absorption is made by carbon sinks such as forests, soils, and oceans.

In industry, Kyrgyzstan does not highlight green development as the priority. For the previous period, the **Strategy for the Sustainable Development of the Industry of the Kyrgyz Republic for 2019–2023** (Government of the Kyrgyz Republic, 2019) did not single out the task of emission reduction as a separate challenge. Instead, it focuses on the modernization of technology and the utilization of new technologies to minimize environmental impacts in the industrial, coal energy, and mining sectors. Essentially, it entails speeding up industrial growth without adding to the environmental load.

The Concept of the Green economy in the Kyrgyz Republic puts forward the problem of energy supply diversification. Hydropower is considered the most promising energy source, but power stations of different capacities and energy sources should be built to reduce dependence on the Toktogul HPP, the only major source of electricity generation (Parliament of the Kyrgyz Republic, 2018).

The country is actively enhancing its infrastructure to cater to the requirements of the sustainable finance sector, aiming to attract private investments for sustainable development. This initiative is outlined in the **Program for the Development of a Green Economy in the Kyrgyz Republic for 2019–2023** (Government of the Kyrgyz Republic, 2019). The Program adopts specific indicators, which are grouped into five blocks and represent green growth in Kyrgyzstan's vision: carbon and energy productivity, natural assets, environmental quality of life, economic opportunities and action policies, socio-economic context, and economic growth.

The Program proposes the introduction of three green taxes: a tax on CO_2 emissions and a tax on air pollutant emissions for gasoline and diesel vehicles; a tax on plastic bags; and an increase in tax rates on single-use plastic goods. The Program also recognizes the need to reform subsidies from the regional budget, which, contrary to sustainable development priorities to improve the energy efficiency of the economy, encourage inefficient use of energy resources. As of H1 2024, the listed taxes have not been implemented; at the same time, fiscal subsidies for electric vehicles have been introduced (Ministry of Economy and Commerce of the Kyrgyz Republic, 2024).

As it stands, the **Kyrgyzstan National Green Taxonomy** was drafted and presented for public hearings in early 2024 (Ministry of Economy and Commerce of the Kyrgyz Republic, 2024). Previously, the **Concept of Carbon Neutrality** was developed (Ecological information service Bishkek, 2024), following the announcement by the President of the Kyrgyz Republic during COP28 that the target for achieving zero emissions had been set for 2050 (UNFCCC, 2023).

Tajikistan

Despite the relatively small contribution of Tajikistan to global GHG emissions, the country is considered one of the most vulnerable to climate change. As existing challenges worsen and new risks emerge, climate change is anticipated to impede Tajikistan in attaining its development goals.

The Tajikistan's first climate commitment within international submissions was made in 2011 in Cancun at COP21. In 2015 it submitted its INDC under the Paris Agreement, which was later transformed into NDC upon the ratification of the Paris Agreement in 2017. Four years later, the country made revisions to its NDC. The **updated NDC** differs from the original one by incorporating an unconditional target for reducing GHG emissions by 2030, along with a conditional GHG emissions reduction target. Moreover, the updated NDC has an enhanced emphasis on adaptation. The targets are defined as follows:

- Not to exceed **60–70%** of GHG emissions as of 1990 by 2030 (unconditional target);
- Not to exceed **50–60%** GHG emissions as of 1990 by 2030, subject to a significant international funding and technology transfer (conditional target).

The primary strategic document outlining Tajikistan's future direction of development is the **National Development Strategy of the Republic until 2030** (Ministry of Economic Development and Trade of the Republic of Tajikistan, 2016). This strategy places significant importance on incorporating the Sustainable Development Goals (SDGs) into Tajikistan's development framework, with a specific focus on enhancing water resource management, creating resilient communities, implementing urgent measures to address climate change, safeguarding terrestrial ecosystems, preventing land degradation and managing disasters, as well as enhancing access to clean water and sanitation. Essentially, the main climate-related efforts focus on adapting industries, tourism, energy, and utilities to changing climate conditions, with a lesser emphasis on mitigating the country's own environmental and climate impacts. The development of "environmentally clean" production and innovation (development of environmental insurance, taxes, loans, subsidies, tariffs, duties, and etc.) are named in the documents as means of meeting environmental standards in industry.

The **Medium-Term Development Program for 2021–2025** (Government of the Republic of Tajikistan, 2021) underscores the paramount significance of socio-economic development issues over climate concerns in Tajikistan. However, the Program is focused on fostering a green economy, particularly through RES development, advocating for resource-efficient and minimal-waste economic growth facilitated by financial mechanisms and investments in green technologies. The outlined priorities for this timeframe include the construction of hydropower plants of various capacities and other renewable energy facilities, the production and deployment of electric

vehicles, the adoption of sustainable consumption practices, and effective waste management and recycling initiatives. A fundamental principle guiding climate action in Tajikistan is that interventions should achieve their objectives without hindering economic development.

Most of the program documents focus on adaptation to climate change rather than on mitigation. The very first climate policy document, the National Action Plan for Climate Change Mitigation (2003), included a series of measures such as the Greenhouse Gas Abatement Strategy and the Strategy of Adaptation to Climate Change, aimed at preventing and minimizing its negative impacts (Ministry for Nature Protection of the Republic Tajikistan, 2003). This Action Plan was preceded by The Strategy of Environmental Protection and Rational Use of Natural Resources of the Republic of Tajikistan until 2015. The current strategic document regarding climate is the **National Strategy for Adaptation to Climate Change for the Period to 2030** that complements NDC key sectors (agriculture, energy, forestry & biodiversity, industry & construction, transport & infrastructure) with seven cross-cutting areas: health, education, gender, youth, migration, environment, and emergencies.

The Concept of Transition of the Republic of Tajikistan to Sustainable Development for 2007–2030 (Government of the Republic of Tajikistan, 2007) elucidates the vision, principles, goals, objectives, and key mechanisms essential for sustainable development. This is achieved through the amalgamation of economic, environmental, and social issues, with the aim of enhancing the living standards of the Tajikistan population. Emphasis on sustainable development is primarily placed on alleviating poverty, which can significantly impede the transition process. Regarding climate change, the strategic goals revolve around ensuring energy security, primarily by harnessing the considerable hydropower potential (Tajikistan's annual hydropower potential is 527 billion kWh, of which only 6 per cent has been developed), and promoting environmental sustainability (Government of the Republic of Tajikistan, 2022). An initiative highlighted in the Concept involves greening of the economy: integrating environmental aspects into pricing mechanisms, refining the fee system for natural resources usage, and mandating environmental insurance. This initiative primarily focuses on elevating fees for the excessive utilization of resources or the release of excessive pollutants.

The **Strategy for the Development of Green Economy in the Republic of Tajikistan for 2023–2037** outlines long-term strategies aimed at promoting environmental sustainability in the economy. These plans are intricately connected to the country's strategic objectives, such as achieving energy independence, improving energy efficiency, enhancing transportation networks to position the nation as a transit hub, ensuring food security, promoting industrial growth, and expanding employment opportunities. In addition to the key sectors identified in previous policy documents, the Strategy highlights the importance of developing green finance instruments. Tajikistan's ability to access green and climate bonds markets is crucial for attracting

foreign investment to support eco-friendly projects within the country. Efforts are also underway to explore options like selling Tajikistan's carbon credits to major global corporations and establishing other financial mechanisms to draw foreign capital.

When it comes to climate financing, Tajikistan depends on external support of development finance institutions or intergovernmental assistance. At the same time, the National Strategy for Adaptation to Climate Change emphasizes the importance of mobilizing domestic resources for sustainable development.

Turkmenistan

Turkmenistan is among the nations that are most vulnerable to the negative impacts of climate change, particularly in agriculture, water resources, public health, and natural ecosystems. The country's climate policy aims to promote economic growth, modernize all sectors of the economy via diversification and reinforcement in the global arena, enhance competitiveness through advancements in technology and energy efficiency, and integrate climate change considerations into sectoral plans and strategies.

20%

reduction in GHG emissions by 2030 compared to 2010 level under the BAU scenario (Turkmenistan)

Turkmenistan first announced its climate commitments in the form of an INDC in 2015 and submitted its first NDC a year later. At first, the modest goal to stabilize GHG emission by 2030 was made. The 2023 revision was based on Turkmenistan's updated National Climate Change Strategy and reflected the results of the mitigation measures discussed with all national stakeholders between 2019 and 2021. The updated **NDC** sets a firm target to reduce GHG emissions in 2030 under the BAU scenario by 20% compared to the 2010 level (UNFCCC, 2022).

Priority sectors as defined in the updated NDC are: energy, transport, agriculture, industrial processes and product use (IPPU), and waste. The main policy instruments for defined areas are the following:

- Improvement of the regulatory and legislative framework;
- Enhancement of institutional structures;
- Introduction of financial and tax mechanisms to stimulate the reduction of GHG emissions;
- Development and implementation of the national system of inventory and monitoring of GHG emissions;
- Development of information tools.

Turkmenistan is taking measures to combat climate change in the context of the **National Program of Socio-Economic Development of Turkmenistan for 2011–2030** (UNFCCC, 2022). The Program outlines a shift towards a more industrial and innovative economy, with a focus on the production of high-quality, competitive goods domestically. This includes adoption of modern energy-efficient and environmentally friendly technologies. As part of this initiative, the Turkmenistan Government is implementing a policy to promote energy saving.

The **Revival of a New Era of a Powerful State: National Program of Socio-Economic Development of Turkmenistan in 2022–2052** (State News Agency of Turkmenistan, 2023) and **Presidential Program on Socio-Economic Development of Turkmenistan in 2022–2028** (Ministry of Foreign Affairs of Turkmenistan, 2022) are long-run strategic development programs that describe the country's vision and future targets. The country is further expanding international cooperation in energy and energy security, sustainable transport, ecology and environmental protection, addressing important issues related to hydrogen energy, food security, and other areas.

The National Climate Change Strategy (Government of Turkmenistan, 2012) of Turkmenistan represents the national vision of climate change issues and is the basis for the establishment and implementation of state policy on issues related to climate change and its consequences. The Strategy identifies vulnerable sectors that are most sensitively affected by climate change. These are agriculture and water sectors, health care, soils and land resources, ecosystems and forestry, and hydrometeorological activities.

The Strategy also defines key policy directions to facilitate a smooth transition towards minimal GHG emissions economy, while not interrupting socio-economic progress. Prioritizing energy efficiency, conservation, judicious utilization of natural gas and oil derivatives, and the promotion of RES are fundamental policy objectives aimed at restricting GHG emissions.

The National Strategy on Climate Change outlines various sources of funding for climate-related initiatives, both from external and internal sources. External financing options encompass established and upcoming financial structures and tools within the UNFCCC. Domestically, the establishment of a National Clean Climate Fund is envisaged, with its resources potentially deriving from activities of the Clean Development Mechanism in the energy and oil and gas industries.

Uzbekistan

Uzbekistan is highly susceptible to the impacts of climate change. In the absence of additional interventions aimed at resource conservation, the nation could potentially confront challenges related to water scarcity, increased desertification, land degradation, rise in the frequency of droughts, and other hazardous occurrences. Such circumstances could lead to disruptions in agricultural production and endanger the country's food security. Uzbekistan possesses considerable capacity for developing renewable energy sources, particularly solar and wind energy, which could effectively cater to the country's increasing energy demands and facilitate a shift towards a more sustainable and green economy.

35%

reducion in the carbon intensity of the economy by 2030 compared to 2010 level (Uzbekistan)

Uzbekistan has demonstrated its dedication to addressing climate change at the global level through the submission of its first NDC in 2018, which was subsequently revised in 2021. The decision to update the NDC was informed by the establishment of a domestic framework for climate action during the period from 2018 to 2021. The **updated NDC** relies on specific measures to tackle climate change for both adaptation and mitigation. The GHG reduction target is to reduce the carbon intensity of the country's economy by 35% by 2030 against 2010 (UNFCCC, 2021).

The updated NDC applies to the energy, industrial processes and product use (IPPU), agriculture, forestry and land use, and waste management sectors. Adopted in 2023, **Strategy "Uzbekistan — 2030"** (President of the Republic of Uzbekistan, 2023) identifies the target slightly differently: to reduce GHG emissions by a unit of GDP by 30% by 2030 compared to their level in 2010. With regard to climate-related issues, the Strategy "Uzbekistan — 2030" prescribes development of the market for "green certificates" in industry and introduction of "eco-labelling" practices; and establishment of a monitoring system covering all greenhouse gases. Five general priorities for sustainable development described in the Strategy include creating favorable environmental conditions for the population.

Expected results of implementation of the Strategy are:

- Reduction of specific GHG emissions per unit of gross domestic product by 10% from the 2010 level;
- Twofold increase in energy efficiency and a decrease in the carbon intensity of GDP;
- Further development of renewable energy sources, bringing their share to more than 25% of total electricity generation.

The **New Uzbekistan Development Strategy for 2022–2026** (President of the Republic of Uzbekistan, 2022) is enforced as the ongoing development strategy. It describes 100 goals to be achieved in five years. The goals include "Fail-safe supply of electricity to the economy, active introduction of green economy technologies in all spheres, increase in energy efficiency of the economy by 20%". This is to be achieved by means of RES, energy efficiency and energy transmission, as well as electric cars promotion. The emission target is stated as reducing hazardous gas emissions per unit of GDP by 10 percent. On a related note, the strategy for the previous period, the Action Strategy for the Five Priority Areas for Development of the Republic of Uzbekistan in 2017–2021 (President of the Republic of Uzbekistan, 2017; Development Strategy Center, 2022), did not contain any specific provisions on environment-related issues.

In 2019, Uzbekistan has defined priorities for facilitating the execution of obligations outlined in the Paris Agreement by formulating the **Strategy for Transition of the Republic of Uzbekistan to a Green Economy for 2019–2030** (President of the Republic of Uzbekistan, 2019). This Strategy articulates the primary goals for the country's shift towards a green economic model, encompassing the enhancement of energy efficiency and rational use of natural resources via technological upgrades and the establishment of financial frameworks. Additionally, the strategy advocates for the integration of environmental criteria into the key sectors of public investments and expenditures, aligned with cutting-edge global standards. Transitional goals include energy efficiency, green criteria in public procurement, public-private partnerships and international cooperation, including with financial institutions, as well as human resources development and resolution of the environmental crisis in the Aral Sea region. To support green investment, the framework for green finance, emphasizing the role of green credits, as well as establishment of special funds are proposed. The Strategy mentions fiscal measures to support sustainable development of a green economy, but does not specify details.

The Plan of Measures to Enhance the Effectiveness of the Transition to a Green Economy (President of the Republic of Uzbekistan, 2022) encompasses a stage devoted to transferring the tax burden of businesses and households towards activities that contribute to pollution and excessive use of resources. This task delves into the viability and possible infrastructure of green taxation, in order to specify the revenue-generating capacity, the socio-economic effects, and the modalities for execution of such a tax.

There is no economy-wide net-zero development strategy yet, but there is one for the electricity sector, developed with assistance of the EBRD and Japanese government. **The Carbon Neutrality Roadmap of Uzbekistan's Electricity Sector** (Ministry of Energy of the Republic of Uzbekistan, 2021) sets the sector-wise carbon neutrality target by 2050. Five priority areas are defined as follows:

- Development of more efficient and low-carbon electricity capacities and associated grid;
- Establishment of a regulatory framework to enhance renewable energy penetration;
- Introduction of subsidy reform and carbon price mechanism;
- Setting awareness-raising campaigns to generate public support;
- Strengthening environmental protection, climate change mitigation, and increasing climate resilience.

4. State of Carbon Pricing in Central Asia and Azerbaijan

Carbon pricing is one of the most effective tools to reduce GHG emissions. By increasing the cost of high emitting fuels and production, instruments such as **Emission Trading Schemes (ETS) and carbon taxes** could promote energy efficiency and incentivize cleaner technologies. According to some estimates, such measures could lower emissions in the electricity sector at less than one-fifth of the cost of alternative policies such as feed-in tariffs or capital subsidies (UNDP, 2021).

The Carbon Pricing Dashboard demonstrates that 89 jurisdictions in the world have implemented compliance carbon instruments covering 12.8 $GtCO_2$ or 24% of global GHG emissions (as of 1 April 2024; World Bank, 2024). The current trend demonstrates the significant progress made by middle-income countries towards carbon pricing instruments (CPI).

Among the countries within the scope of this research, **only Kazakhstan has carbon pricing instrument in place.** Kazakhstan implemented ETS in 2013, and now it covers 47% of the country's CO_2 emissions, about 21% of Central Asian CO_2 emissions, or 0.29% of the global emissions. The current price is US$1.06 per tCO_2, and is one of the lowest among all the countries with CPI in place. For comparison, the High-Level Commission on Carbon Prices recommends **US$63–127 per tCO_2** as a price range to limit temperature rise to well below 2°C (World Bank, 2024). The OECD suggests similar carbon benchmarks: **EUR60–120** required by 2030 (OECD, 2023).

Kazakhstan implemented ETS in 2013, and now it covers

47%

of the country's CO_2 emissions, about

21%

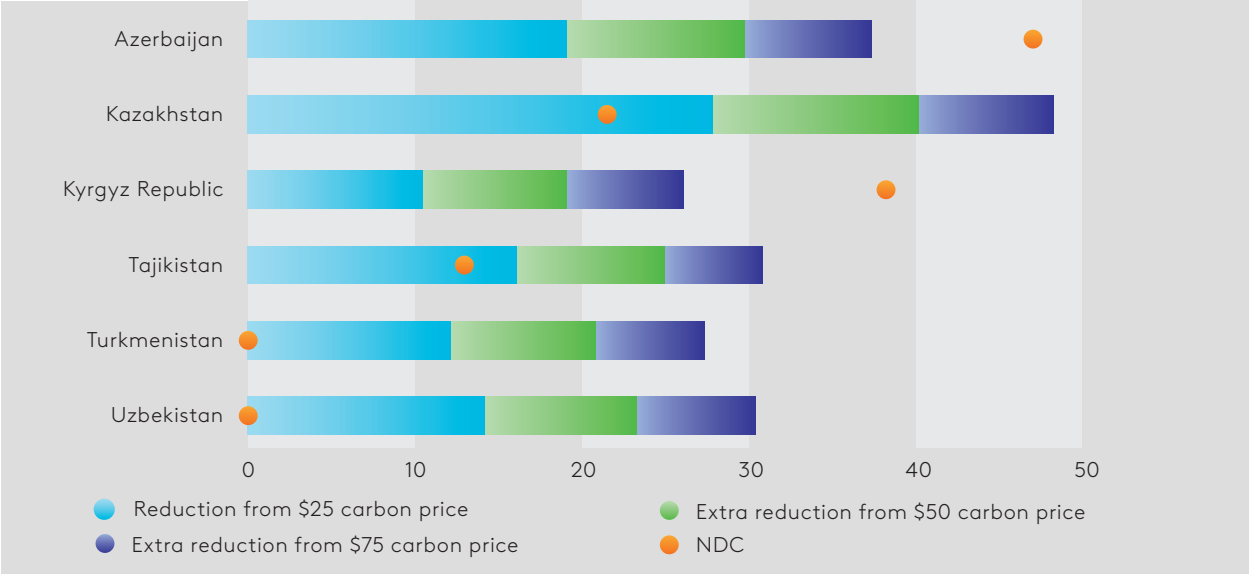
of Central Asian CO_2 emissions, or

0.29%

of the global emissions.

Carbon taxation is considered to be **a powerful tool to meet the Paris Agreement commitments and corresponding NDCs**. The IMF's Climate Policy Assessment Tool (CPAT) suggests that the current mitigation policy mix in Azerbaijan, the Kyrgyz Republic, and Kazakhstan may not be sufficient to curtail emissions to their target, whereas Uzbekistan and Tajikistan appear to be on track to meet their unconditional commitments (IMF, 2023). The CPAT assesses that the weighted average NDC emissions target in the Caucasus and Central Asia can be met with a **uniform US$25 carbon tax per tonne on average**, before elimination of subsidies. Kazakhstan and Tajikistan could reach their targets with a tax of less than US$25, and Azerbaijan and the Kyrgyz Republic with US$75 (IMF, 2023).

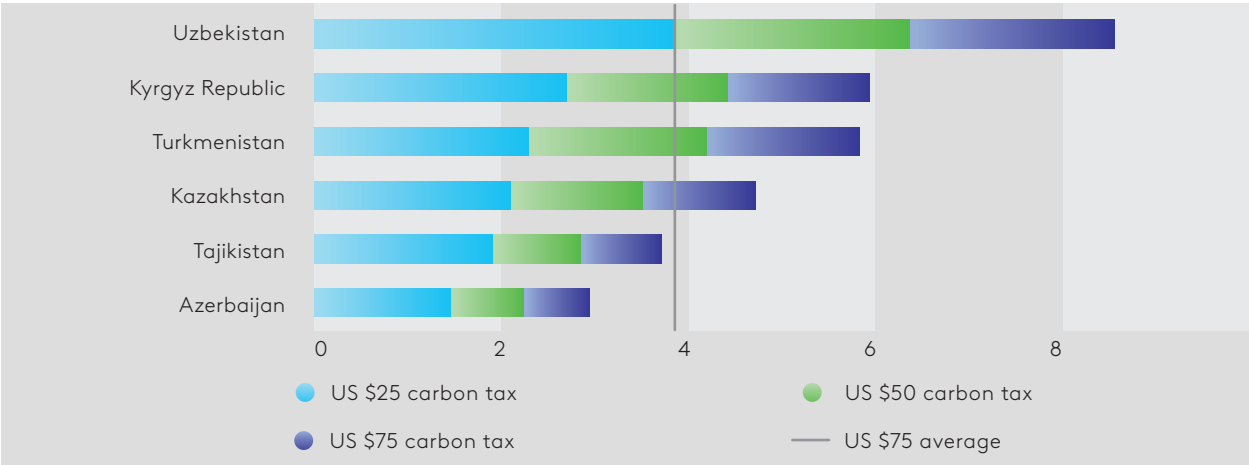
↓ **Figure 17. Emission Reduction and Pledges, Emission, % of baseline**



Source: IMF, 2023.

Depending on country circumstances, carbon taxation could be **a source of additional revenue,** contributing to the strength of national budgets**.** According to the 2024 World Bank report, in 2023, carbon pricing revenues reached a record US$104 billion, with 75 carbon pricing instruments operating worldwide (World Bank, 2024). The average US$25 carbon tax, suggested by the CPAT, could generate **about 2.6% of GDP in revenue** in the Caucasus and Central Asia (for example, almost 3% of GDP in Turkmenistan and Uzbekistan) (IMF, 2022). Moreover, some research examining the dynamic effect of carbon pricing on socio-economic indicators in countries participating in the EU ETS finds a positive impact on employment growth immediately after and up to five years after implementation (World Bank, 2024).

↓ **Figure 18. Potential Carbon Tax Revenue, % of GDP, 2030**



Source: IMF, 2022.

As of now, carbon pricing remains most common in the power and industry sectors, but its effectiveness depends on the other energy-related policy incentives, not directly linked to climate goals, but also providing price signals. The most obvious examples of indirect carbon pricing are **fuel excise taxes and fossil fuel subsidies**, which increase and decrease the net carbon price signal, respectively (World Bank, 2024). When carbon pricing instruments aim to increase the cost of carbon and subsequently reduce GHG emissions, large-scale fossil fuel subsidies counteract this and, essentially, prevent the effective implementation of CPI, even neutralizing its impact (UNFCCC, 2021). In a study of 26 developing countries, subsidy reversal was found to potentially reduce emissions by an average of 6.4% by 2025 compared to business as usual . Eliminating fossil-fuel-based energy subsidies before introducing a positive charge on carbon emissions is thus at the core of effective carbon pricing strategies in many developing countries (UNDP, 2021).

In a study of

26

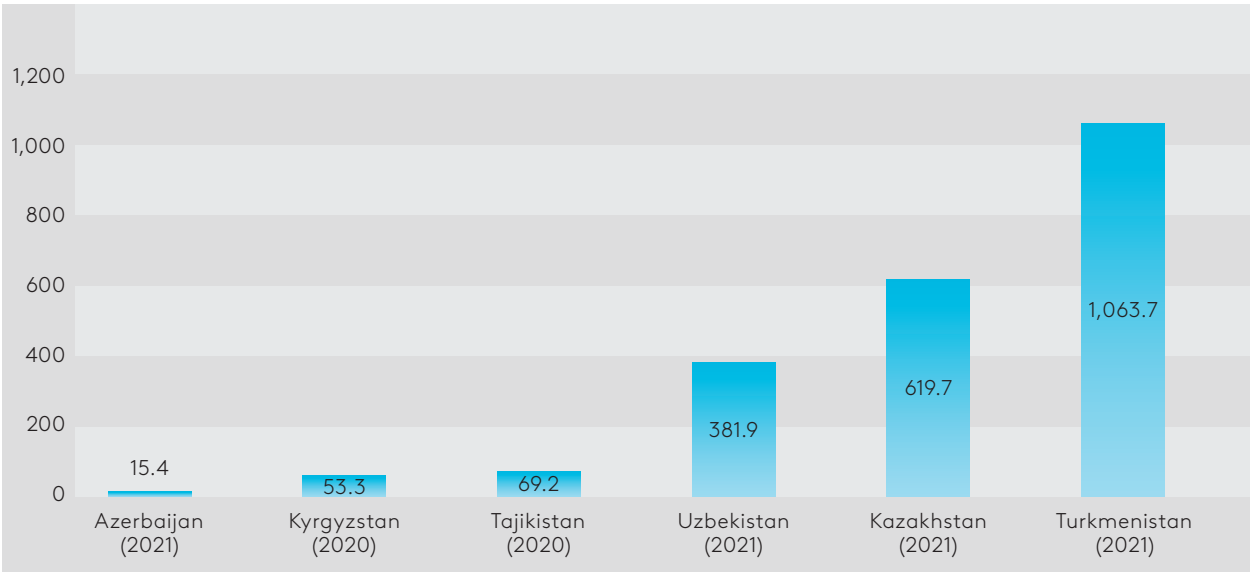
developing countries, subsidy reversal was found to potentially reduce emissions by an average of

6.4%

by 2025 compared to business as usual.

Kazakhstan, Uzbekistan, and Turkmenistan **heavily subsidize their domestic consumption of fossil fuels**, so that retail prices of power and transport do not reflect the environmental cost of fossil fuel, are significantly below the efficient fuel prices, and discourage investments in renewable energy. Although explicit fossil fuel subsidies have been declining over the last decade, they still account for more than 2% of GDP in the Central Asia. **The removal of energy subsidies could lower the estimated carbon tax**. Thus, in order to achieve the region's 2030 emissions reduction goals, the IMF suggests implementing both approaches: gradually removing all fuel subsidies for more efficient fuel pricing, and introducing a carbon tax of US$4 per ton of CO_2-eq in the Caucasus and Central Asia over the next eight years (IMF, 2022).

↓ **Figure 19. Fossil-Fuel Pre-Tax Subsidies (Consumption and Production) per capita, US$**



Source: UNECE, 2021

Considering the strong efforts made by the countries to achieve their NDCs, including energy efficiency measures and unlocking the potential of renewable energy, when considering carbon pricing internally policymakers should remember the opportunities linked to **carbon credits and international voluntary carbon markets** (Tran, D. 2023).

Azerbaijan

As mentioned in Chapter 3, in its recent **NDC**, submitted in 2023, Azerbaijan commits to reducing GHG emissions by 40% by 2050 compared to 1990 levels, conditional on international support. The previous commitment included the target to reduce emission levels by 35% by 2030 compared to 1990 levels. The energy sector is responsible for 78% of the total amount of emissions calculated for the NDC (UNFCCC, 2023). Although Azerbaijan is a signatory to the Paris Agreement on climate change, it has not yet committed to a domestic net zero target.

According to the World Bank, Azerbaijan is currently not on track to achieve its NDC targets. Azerbaijan's 2030 emissions target and its target of 30 percent renewable energy in the power generation mix by 2030 would require about US$0.8–1.0 billion of annual investments in clean energy by 2030. That would put Azerbaijan on track to decarbonize the power sector almost entirely by 2050 and also decarbonize other parts of the economy (World Bank, 2023).

Azerbaijan plans to reduce GHG emissions by expanding the use of renewable energy sources; bringing the installed power of renewable sources to at least 30% of the total capacity is one of the main goals of the country. Analysis shows that in order to achieve this goal, it is necessary to gradually launch newly built capacities by 2030 with a total volume of about 1,500 MW (UNFCCC, 2023). In March 2024, Azerbaijan signed **the Global Methane Pledge**, an important voluntary commitment by nations to reduce their emissions of methane, a powerful greenhouse gas. The initiative aims to reduce overall methane emissions by 30 percent by 2030, compared to 2020 levels. Currently, 155 countries, which account for nearly half of global methane emissions, have signed up (COP29, Baku, Azerbaijan, 2024). As of July 2024, there is no publicly available data on actions planned by Azerbaijan to fulfill the pledge.

The country does not have a Zero Emissions Development Strategy, but one is said to be under development as of 2024. The Strategy will cover a broad range of incentives, from reducing the methane emissions to encouraging the private sector to participate in green projects, issuing green credits, and **introducing a carbon tax**. According to the Minister of Environment and Natural Resources of Azerbaijan, the law introducing a carbon tax in the country is already drafted, with its primary aim to promote investments in GHG emissions reduction and use of modern technology

(Sputnik Azerbaijan, 2024). A Monitoring, Reporting, and Verification (MRV) system, a necessary prerequisite for launching carbon pricing, is yet to be created according to the **Strategy of Socio-Economic Development of the Republic of Azerbaijan for 2022–2026** and related the action plan (UNFCCC, 2023). The UNEP launched the corresponding capacity-building project for Azerbaijan in 2020, which will last till 2050. Its primary aim is to meet the reporting requirements of the enhanced transparency framework of the Paris Agreement by establishing a tracking system to support reliable domestic MRV arrangements (UNEP, 2024).

The major economic driver for the carbon pricing initiatives that could help decarbonize the country's economy and open green growth opportunities is **the heavy dependence on oil and gas**, which account for a third of GDP and 90% of exports. According to the World Bank, by 2060, a global net-zero economy would have reduced Azerbaijan's exports by close to 3.4 % of GDP compared to a business-as-usual (BAU) scenario, even if Azerbaijan meets its climate targets for 2030 and 2050 (World Bank, 2023; World Bank, 2024). The more direct and immediate factor such as **the EU CBAM** would bring less risk for the economy due to its comparatively small amount of non-fuel exports. The aggregate relative CBAM exposure index for Azerbaijan is 0.004174, with fertilizers being the most exposed CBAM product. Although 16% of the country's CBAM-exposed product exports goes to the EU, its share in the country's GDP is less than 0.1% (World Bank, 2023). Modeling suggests that the introduction of CBAM will reduce Azerbaijan's real GDP by 1%-5% by 2060 depending on the scenario. Even not directly exposing oil and gas industry, CBAM will also drive export diversification in Azerbaijan by affecting energy-intensive manufacturing exports (World Bank, 2023).

The World Bank suggests decarbonization measures in Azerbaijan including carbon pricing, together with **phasing out of fossil fuels subsidies**. This prerequisite will allow increasing economic growth and welfare and keep the rise in energy system costs resulting from investments in decarbonization at a comparatively modest 13% by 2060 in the net-zero scenario (World Bank, 2023). As of now, end user tariffs for electricity, natural gas, and oil remain lower than their economic cost due to implicit and explicit subsidies. Over 2016–2021, explicit energy subsidies averaged US$2.3 billion or 5.1% of GDP. The full costs of underpricing amounted to a staggering 33.6% of GDP in Azerbaijan or US$14.6 billion in 2020 (World Bank, 2024). In addition to limiting investments in critical infrastructure and reducing the competition, fossil fuel subsidies and low end-user tariffs weaken the incentive framework for private sector investment in renewables and energy efficiency. Recognition of the need to remove pricing distortions has not yet translated into tariff reform and subsidy phase-out.

The World Bank suggests building future regulation on gradual fossil fuel subsidy phase-out by 2030 accompanied by gradual deregulation of natural gas, electricity, and fuel prices, and the introduction of economy-wide carbon pricing. The elimination

The elimination of two-thirds of current fossil fuel subsidies is sufficient to achieve the 2030 NDC target of Azerbaijan

of two-thirds of current fossil fuel subsidies is sufficient to achieve the 2030 NDC target. Additional mitigation efforts are needed to comply with the 2050 NDC target, including elimination of all fossil fuel subsidies and the introduction of carbon pricing of around US$25 per t CO_2 by 2035 and US$41 per t CO_2 by 2050. The negative impact of carbon pricing expressed in increased prices of energy products could hinder the competitiveness of energy-intensive sectors in Azerbaijan and cause social tension, making the reform socially unacceptable. To soften possible shocks and mitigate the impacts of the transition period, the revenue from recycling measures could be targeted to the most vulnerable and low-income population. Energy subsidy phase-out and carbon pricing would lay an additional burden on carbon-intensive production, releasing tax revenues collected by the state. These revenues could be further recycled in favor of less carbon-intensive activities, further economic diversification and the most vulnerable and low-income. Compensation for the direct economic cost of the net-zero transition in terms of reductions in GDP annual growth rates would be achieved via structural change and diversification into less polluting sectors (World Bank, 2023).

Although the draft of the carbon pricing law is not yet available, this opportunity was discussed in the media, also considering the focus on climate-related topics in general ahead of the Azerbaijan Presidency at COP29 in 2024. Without denying the general benefits of the carbon tax and supporting this initiative, some experts consider the neutralization of corresponding negative socio-economic effects to be the primary task that could be achieved by utilizing the revenues from the carbon tax to compensate for effects arising from price increases (Azernews, 2024).

Although Azerbaijan has yet to consider mandatory carbon pricing, the country has some experience in carbon credits trade. In 2022, the **State Oil Company of Azerbaijan (SOCAR)**, for the first time, certified emissions from oil and gas production under the Upstream Emission Reduction (UER) project. According to the European Union's Fuel Quality Directive, oil and gas suppliers implement UER projects to reduce emissions during operations, as well as to minimize their impact on the environment and obtain relevant certificates. The UER certificates obtained as a result of the process can then be sold to energy suppliers, which is a tool for those companies to achieve their emission reduction goals. In the result of the Leak Detection and Repair (LDAR) pilot project implemented by SOCAR in cooperation with the Norwegian "Carbon Limits" company, emission of 14,500 tonnes of CO_2-eq were prevented, certified, and sold, thus allowing SOCAR to earn a profit of US$1.76 million (Report, 2022). According to its newly developed decarbonization program, SOCAR plans to completely stop gas flaring by 2030, reduce emission intensity from corporate activities by 30% by 2035, and reach Net Zero in 2050 (Trend, 2024).

In 2024, according to some sources, Azerenerji, the energy operator of Azerbaijan, applied to two foreign companies to obtain carbon certificates for seven small hydropower plants in Kalbajar and Lachin. Earlier in 2024, within the framework

of cooperation with SOCAR Trading, the company applied to Qatar's Global Carbon Council and Switzerland's Gold Standard to obtain carbon certificates for these hydropower plants. According to preliminary estimates, the activity of the seven plants will prevent the emission of 45,000–50,000 tonnes of CO_2 per year. The news about Azerbaijan discussing with the World Bank the possibility of monetization of carbon credits within the framework of preparation and implementation of the joint project on electricity transmission also proves that the country is receiving financial benefits from decarbonization and discovering opportunities on the voluntary carbon markets (Caliber, 2024).

To sum up, Azerbaijan being a *netto* exporter of oil and gas, faces global climate transition risks if its decarbonizing efforts are not timely and not sufficient. Since the country would hardly achieve its NDC with the current mitigation efforts, further incentives are required to boost investments in renewable energy and green technology. The gradual fossil fuel subsidy phase-out accompanied by targeted social support and MRV development could prepare the country for introduction of carbon pricing instruments.

Kazakhstan

According to the 2022 Global Climate Change Research Database, the cumulative share of global GHG emissions in Central Asian countries amounted to 1.36%, of which Kazakhstan had the biggest share of 0.62%. Kazakhstan ranked 24th out of 221 countries in terms of CO_2 emissions, 14th in per capita emissions, and 11th in carbon intensity of GDP in 2022 (Global Carbon Atlas, 2022).

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Kazakhstan has attained a sufficient degree of climate policy development to implement its own fiscal measures over emissions. The regulatory measures implemented in the Kazakhstani carbon market are compulsory and encompass setting sectoral and individual quotas on emissions and a framework for carbon credits trade, distribution of free allowances, and negotiating on complementary emission allowances, as well as penalties for failing to adhere to emission restrictions.

As mentioned in Chapter 3, **ETS** as a market-based instrument for reducing greenhouse gas emissions was introduced in Kazakhstan in 2013 and is currently operating. The government sets a cap on CO_2 emissions (i.e., quotas) for individual emitting equity in several sectors of the economy: electric power industry, oil and gas industry, mining industry, metallurgical industry, chemical industry, and production of building materials (cement, lime, gypsum, and bricks). The emitter is expected to meet these quotas (i.e., allowances, carbon units) at a rate of one quota per ton of CO_2. Each carbon quota is allocated to the operator's account in the state register, where

the emitter must submit an annual report on GHG emissions. Quota redemption (withdrawal of carbon units from circulation) is made in accordance with the amount of verified CO_2 emissions. If this quota is exceeded due to an increase in production, the emitter can apply for additional quotas from the state carbon quota reserves. If the emitter does not receive this indulgence, it approaches the carbon market. On a contractual basis or by auction, the company can purchase quotas from other emitters who have produced emissions less than their quotas or from suppliers who have registered carbon offset units resulting from the corresponding projects, thus encouraging companies to emit less or develop climate projects. Otherwise, the emitter will be fined 5 MCI (monthly calculation index) for each exceeded ton of CO_2 (Parliament of the Republic of Kazakhstan, 2021).

Since the launch of the system, four **National Carbon Plans** — the total number of carbon quotas to be distributed among the quota subjects by regulated sectors of the economy — have been implemented. The Ministry of Ecology and Natural Resources also defines a carbon budget of the whole country for a four-year period. The carbon budget is the sum of all sectoral quotas and additional carbon quota reserves. The reserves are complementary allowances for emitters that raised production, overdrew their limitations, and were not able to reaching out the quota.

In the first two National Plans (2013, 2014–2015), the historical approach was utilized for quota allocation, whereby quotas were distributed according to actual emissions for previous years. In 2016, enhancements were made through the adoption of specific benchmarks (sectoral GHG emission coefficients). Currently, a total of 61 benchmarks have been approved, based on the average carbon intensity of the corresponding sectors in 2013–2015 (Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, 2021). This approach fosters competition among emitters and encourages businesses to decrease emissions.

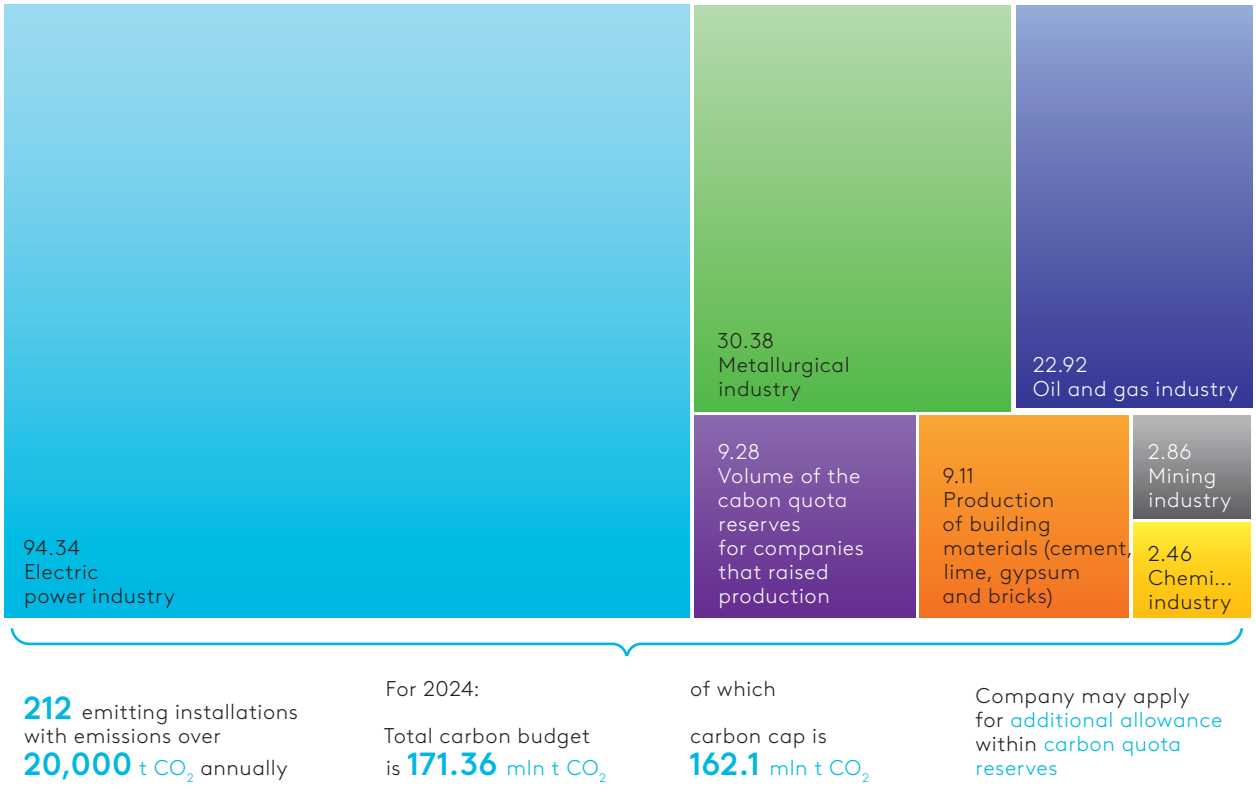
58%
The highest share of allowances is allocated to the electric power industry

19%
metallurgical industry

14%
and oil and gas industry.

Now the ETS covers 212 plants, each of which emits more than 20,000 tonnes of CO_2 per year. Based on the National Carbon Plan for 2024 and 2025, the total quota for 2024 for all regulated sectors is set at the level of 162 mln tonnes of CO_2, and for 2025 it is 158 mln tonnes (Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, 2022). The highest share of allowances is allocated to the electric power industry (58%), metallurgical industry (19%), and oil and gas industry (14%). The carbon budget for 2026–2030 is under development and, according to the Minister of Ecology, the share of free allowances is expected to decrease not less than by 2.73% annually.

↓ **Figure 20. Kazakhstan's Carbon Budget for 2024**



Source: Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, 2022.

Furthermore, as outlined in the Environmental Code, offset projects aimed at emissions reduction or absorption could be executed on a voluntary basis. The companies executing such projects are given offset units that are registered at the same carbon market, so that those entities that overdraw their quotas can buy offsets. In 2021–2024, approximately 63 offset renewable energy projects were approved by the Ministry of Ecology and Natural Resources, resulting in a cumulative reduction of around 4 mln tonnes of CO_2 (Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, 2024).

In 2021–2024, approximately

63

offset renewable energy projects were approved by the Ministry of Ecology and Natural Resources, resulting in a cumulative reduction of around

4 mln

tonnes of CO_2

Since the start of ETS operation in Kazakhstan in 2013–2015, the amount of GHG emissions has not been effectively decreasing. The highest GHG emissions were recorded in 2018 — 392.8 mln tonnes of CO_2, when the total sales of carbon units for the period 2013–2022 comprised only 13.1 mln tonnes of CO_2 (Bureau of National Statistics). The average price for this period was around **US$1.8 per ton of CO_2,** which is very low compared to the average EU ETS price of EUR70 (Statista, 2024), to US$63–127 price recommended by the High-Level Commission on Carbon Prices, and the OECD benchmark of EUR60–120. It is expected to increase to US$16.9 per tonne of CO_2 in 2023–2025 and up to US$50.8 per tonne of CO_2 by 2026–2030 (Parry et al, 2022).

The carbon market data published by national ETS operator Jasyl Damu (100% owned by the Ministry of Ecology) is fragmented; it sometimes combines statistics for several years and does not make visible correlations between amount of emissions, volume of ETS trade operations, and price per carbon quota.

The existing ETS system, introduced as a decarbonization measure and operating for almost a decade, faces certain challenges that prevent it from reducing emissions effectively.

First, the regulated carbon market is limited to a specific number of participants (around 200 emitting installations or 130 legal entities) from six sectors; such high-emitting sectors as agriculture and construction are not covered. In terms of overall amounts, the ETS covers about 43% of country GHG emissions. The mechanism does not incentivize other companies to join the market, either voluntarily or on a mandatory basis, due to the limited number of participants among the emitters and the low carbon price, which does not provide enough incentive for companies either to reduce emissions or to implement offsetting projects. Regulation applied to a low base will not have the impact required to achieve the goal of carbon neutrality.

Second, ETS covers only CO_2 emissions. Kazakhstan is considering expanding coverage of the ETS to include nitrous oxide (N_2O) and methane (CH_4) from 2026, with the latter accounting for the second largest share in country emissions (21%) and being 28 times more powerful in terms of global warming potential than CO_2 (World Bank, 2022). This initiative could help Kazakhstan to achieve its commitment under the **Global Methane Pledge**, which the country joined in 2023. Kazakhstan has already developed a roadmap to meet its methane reduction commitment, and was schedules to present it during the UN Climate Conference in November 2024 (Eurasianet, 2024).

Third, the cheap price of carbon units reduces the effectiveness of ETS as a decarbonization instrument: companies find it easier to buy carbon units than to reduce GHG emissions by introducing additional measures. Companies establish agreements on sales and prices between themselves on a negotiable basis, rendering the market mechanism ineffective. Some experts propose to set fixed minimum and maximum prices for allowances to increase the certainty of quota predictions in the financial planning of a company. The Ministry of Ecology proposed (El.kz, 2024) to improve the auction mechanism for ETS via introducing closed auction by bidding with a single price. This more competitive approach would revitalize the carbon market and form an effective market price for carbon. According to the Carbon Neutrality Strategy, total investments of US$610 billion are required to achieve carbon neutrality, setting a price of decarbonization at US$65.4 per ton of CO_2 (President of the Republic of Kazakhstan, 2023). Considering the current ETS price

of around US$1 per ton of CO_2, reaching the stated threshold seems challenging and requires amendments and additions to the carbon market regulation.

The world best practices, such as the Canadian carbon pricing mechanism, are aligned with the national long-term emission reduction targets and include a steady increase in the carbon price. In the Canadian system, the carbon price started at US$20 per ton of CO_2 in 2019, reached US$80 per ton of CO_2 recently, and is expected to reach US$170 per ton of CO_2 by 2030 (Carbon Credits, 2024). This gradual price rise becomes a financial incentive for businesses to pollute less, thus pushing companies to offer more climate-friendly products and services.

Fourth, the ETS does not provide transparency in quota trading, since information about buyers and sellers is not disclosed. The emissions verification framework and reporting methodologies currently do not guarantee sufficient confidence in carbon offsetting projects. Emissions data is collected according to the procedures of Environmental Code, based on the reports submitted by sub-accounting companies to the Ministry of Ecology. There is no database of participants and volume; only aggregated data on emissions, not broken down by companies, is available in national statistics. The data from different providers could differ from the data published on a national level. The example of other more mature markets could be useful: for example, the EU ETS publishes reports with total number of covered companies, emissions, and revenue.

Fifth, the system offers many indulgences for companies that fail in their attempts to comply with carbon regulation and stick to the quota, as high-emitters often make for the critical infrastructure keeping key areas of the national economy running. When increasing their production capacities, enterprises can apply for additional free allowances from the carbon reserves, though the government decides upon expansion of their quota. Thus, in fact, enterprises from carbon-intensive industries have no incentive to reduce their emissions or implement additional green technologies (Government of the Republic of Kazakhstan, 2021).

Kazakhstan's energy sector is dependent on fossil fuel: the coal industry accounts for 70% of the country's electricity production and 100% of its coke and chemical production, in order to meet the growing demand of the municipal sector and the population. **Fossil fuel subsidies** are provided to energy producers and agricultural producers (Ministry of Energy of the Republic of Kazakhstan, 2017). Based on World Bank estimations, the country now faces the challenge of phasing out inefficient subsidies and modernizing its energy infrastructure (World Bank, 2024). Kazakhstan's fossil fuel subsidies amounted to approximately 6% of its 2021 GDP, placing it among the top 25 countries in the magnitude of such subsidies. Recognizing the need for change, the government has committed to reforming and gradually phasing out these costly subsidies, and as part of this effort has introduced initiatives like the "tariff for investment" program to facilitate this transition (Ministry of National Economy

of the Republic of Kazakhstan, 2023). The program is aimed to attract large-scale investments in 2023–2029 to modernize the engineering networks of electricity, heat and water supply, as well as wastewater disposal, and to ensure a 20% reduction in depreciation by 2029. In other words, this program should support electricity producers while reducing subsidies through incentive-based tariff regulation. Although carbon intensity reduction is not the primary goal of the initiative, it can be assumed that the modernization of outdated infrastructure could make this additional positive impact as well.

According to the latest World Bank country report, since demand for fossil fuels is gradually decreasing, traditional revenue streams may dwindle, and generating a new source of fiscal revenues is becoming increasingly essential. In this sense, the government should establish a robust carbon price, including by lowering the quota on emissions allowances in the ETS. Alongside expanding the coverage of the current ETS, the government considers implementation of a **carbon tax** on transport fuels and other specific products, in conjunction with the existing ETS mechanism, as a policy measure fostering a transition towards cleaner energy (World Bank, 2024).

Alignment of national carbon regulation with the **EU CBAM** is an urgent need in order to adapt efficiently and to avoid prospective losses, as carbon price growth rates may not be able to overtake the terms assigned by the EU. Currently, the Ministries initiated discussion of measures to both improve ETS and implement a carbon tax. The Ministry of Ecology and Natural Resources of the Republic of Kazakhstan initiated discussions on the possibility of a carbon tax in 2021. The initiative was offered in order to reduce the vulnerability to European competitors of Kazakh exporters of ferrous and non-ferrous metallurgy products, mineral products, chemical fertilizers, and cement. As of now, these discussions are not yet expressed in specific initiatives or draft regulation. According to the Trade Policy Development Center QazTrade, EU countries account for 47% of Kazakhstan's exports. In 2024, Kazakhstan exported US$38.142 billion worth of products to the EU, of which US$388.7 million was carbon-intensive goods (0.9% of exports). According to UNCTAD calculations, Kazakhstan could lose US$207 million in export revenue per year if CBAM is introduced at the price of US$44, and $352 million at the price of US$88 (UNCTAD, 2021). Based on CBAM regulation, if the non-EU producer has already paid a carbon price for producing the imported goods in a third country, that cost can be deducted from the CBAM obligation, subject to the carbon price of the third country being recognized by the EU.

At this point, the Carbon Neutrality Strategy, a key climate document, mentions the cap-and-trade system only in passing, focusing on measures other than fiscal. It was expected that by the end of 2024, the Ministry of National Economy would develop a detailed roadmap for the implementation of the Strategy, identifying more practical measures. It was expected that the roadmap would cover ETS, green funding, energy efficiency of enterprises and buildings improvement, decarbonization of industrial processes, and economy-wide low-carbon policy measures.

Some market experts suggest improving the quality of the internal monitoring, reporting, and verification system, as reliable information on the quantity and quality of the company's emissions is the basis for strategic planning and tracking of GHG emission reduction progress. Another suggestion is to identify energy efficiency improvement for applied technology and equipment by implementing the best available technologies, as well as putting more RES projects into operation. It has also been suggested to integrate carbon price in company development strategies or internal programs, develop a mechanism by which companies can price their GHG emissions in a way that drives positive change in their business and raises awareness of climate change and transition risks among the company's key decision-makers.

To sum up, the limitations of Kazakhstan's ETS refer to most fundamentals: economic sector and activity coverage, types of emissions covered (only CO_2), and emitters' coverage (limited scope of sectors and emitting installations). Low carbon price and free allowances for emitters do not motivate companies to decrease emissions; and the market volume of deals is extremely small (US$9.6 mln compared to EUR751 billion for the EU's carbon market and US$62.7 billion for North America in 2022; Refinitiv, 2023). The absence of accurate and complete data on transactions does not allow assessment of the ETS's actual efficiency.

To foster decarbonization goals, the government is considering strengthening legislation by decreasing the level of allowances for emitters, modernizing the ETS system by implementing an auction system, expanding ETS coverage to other GHGs, and implementing a carbon tax to meet further CBAM regulations. These plans are supported by international collaboration: in May 2024, Kazakhstan joined the Global Carbon Pricing Challenge (GCPC) as a partner. The GCPC is a leader-level initiative, announced by Canada during COP26, which aligns economic objectives with low-carbon objectives, and drives investment in clean innovation and technology (Global Carbon Pricing Challenge, 2024).

Box. Case Study: Kazakhstan's Carbon Pricing Implementation

Introduction Date

In 2013, Kazakhstan was the first country in the Central Asian Region to implement a nationwide cap-and-trade emissions trading system. Major fossil fuel producers and GHG emitters in Kazakhstan introduced an emissions-trading scheme (KAZ ETS), which aimed to cover the country's principal oil and gas extraction firms, coal mine operators, and power companies; however, the KAZ-ETS covered only 55% of their CO2 emissions (Environment Defense Fund, 2016). Table 3 shows that the KAZ ETS for CO2 emissions is implemented for large enterprises in the energy, industrial processes for oil and gas, coal mining, metallurgy, chemical, and manufacturing sectors. This translates to 41.1% of the country's emissions (ADB Policy Brief, 2024).

Phases of Implementation

The framework was implemented in phases to accommodate expanding sectoral coverage, while constricting the allowances to encourage emission reduction. The first phase was the pilot phase, in which allowances were allocated freely based on baseline emissions relative to 2010. The second phase (2014 and 2015) used 2011–2012 as the baseline, and the cap was estimated to reflect a 1.5 percent reduction in allowances.

↓ **Table 3. Second Compliance Period of KAZ ETS, 2014–2015**

Target	Overall Target: 7% reduction below 1990 levels by 2020 and a 15% reduction by 2025 compared with the 1992 GHG emission level. The energy sector's target was a 3% reduction by 2015 relative to 2012 levels. Phase II Target: 0% in 2014 and 1.5% emission reduction relative to individual 2011–2012 baseline
CAP	155.4 million tonnes of CO_2 million tonnes in 2014 and 153 of CO_2 million tonnes in 2015
Carbon Price	US$2.5 (March 2014)
Green House gases covered	CO_2
Number of Entities Covered	166
Sector Covered	Oil, coal, and gas production; the power sector; mining and metallurgy; chemical industry; agriculture (inclusion currently being debated); and transport (inclusion currently being debated)
Threshold	>20,000 tCO_2/year (based on 2010/2012 levels)
% total emissions covered	55%
Compliance Tools & Flexible Mechanisms	Use of offsets, borrowing, joint implementation, linking

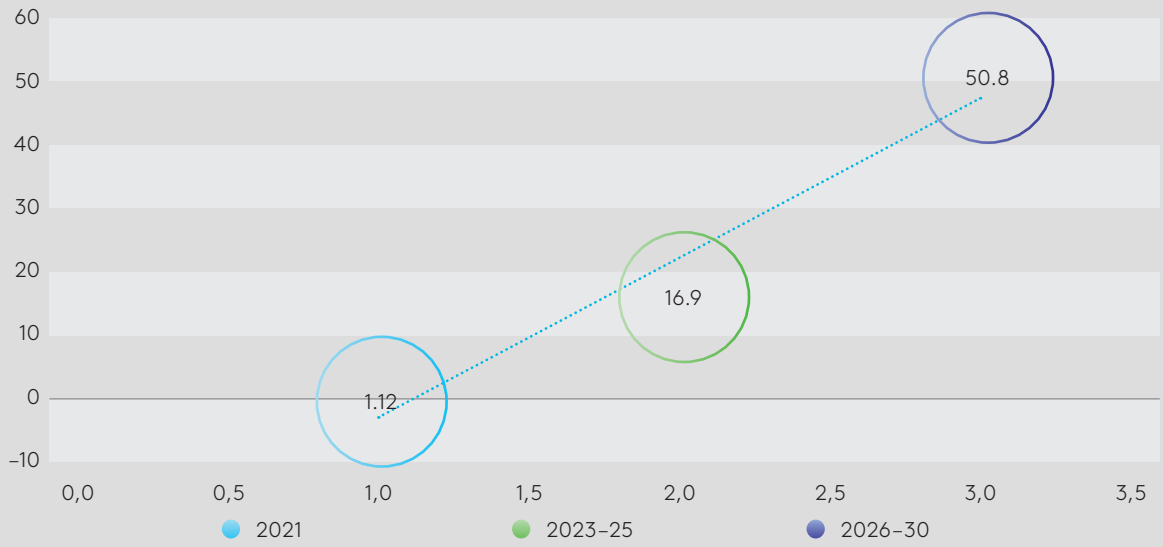
Source: Environmental Defense Fund, 2015.

The government suspended its emission trading system for two years starting from January 1, 2016, to address the variation in administrative procedures before Phase 3 resumed in 2018.

Kazakhstan's Carbon Prices

Figure 21 shows that carbon prices in Kazakhstan in 2021 were US$1.12 per tonne of CO2. The document also committed the country to increase to US$16.9 per tonne of CO2 in 2023–2025 and up to US$50.8 per tonne CO2e in 2026–2030. In addition, the government plans to reduce free quotas by an average of 5.4% per year until 2025.

↓ **Figure 21. Carbon Prices in Kazakhstan, 2021–2030, US$/t CO_2**



Source: SRK Consulting, 2021.

Table 4 shows the Kazakhstan emission trading system. The KAZ ETS established a limit on carbon credits to be distributed to entities with annual emissions exceeding 20,000 tonnes of CO_2.

↓ Table 4. Kazakhstan's Emissions Trading System

Target	338.1 MtCO2e (2021) By 2030: 15% (unconditional) to 25% (conditional) reduction from 1990 GHG levels (NDC) By 2050: 40% reduction in CO_2 emissions in the power sector from 2012 levels (Concept of Transition to Green Economy, 2013) By 2060: Carbon neutrality (pledge during United Nations Climate Ambitions Summit in 2020)
Verified ETS Emissions	159.90 $MtCO_2$
CAP	**Phase 1:** 147 $MtCO_2$ **Phase 2:** 2014: 154.9 $MtCO_2$ (plus a reserve of 18 $MtCO_2$) 2015: 152.8 $MtCO_2$ (plus a reserve of 20.5 $MtCO_2$) **Phase 3:** 2018 to 2020: 485.9 $MtCO_2$ (plus a reserve of 35.3 $MtCO_2$) **Phase 4:** 2021: 159.9 $MtCO_2$ (plus a reserve of 11.5 $MtCO_2$) **Phase 5:** 649.8 $MtCO_2$ for the overall period, with declining annual caps 2022: 166.2 $MtCO_2$ (plus a reserve of 11.8 $MtCO_2$) 2023: 163.7 $MtCO_2$ (plus a reserve of 11.6 $MtCO_2$) 2024: 161.2 $MtCO_2$ (plus a reserve of 11.5 $MtCO_2$) 2025: 158.8 $MtCO_2$ (plus a reserve of 11.3 $MtCO_2$)
Greenhouse gases covered	CO_2
Number of Entities Covered	128 companies (201 emitting installations)
Sector Covered	Phase 1 & 2: Power sector and centralized heating; extractive industries and manufacturing: oil and gas mining, metallurgy, chemicals industry Phase 3, 4 & 5: Same as Phase 1 plus processing industry (production of building materials: cement, lime, gypsum, and brick)
Threshold	Facilities emitting more than 20,000 tCO_2/year
% total emissions covered	47%

Source: International Carbon Price Partnership, 2022.

Kyrgyzstan

As mentioned in Chapter 3, Kyrgyzstan's **NDC** includes emission reduction targets for several cases: a target for 2025 and 2030, with and without conditions for international financial support. Although within the NDC the country has identified adaptation and mitigation action and policies, and also emphasized the government's commitment to catalyze private investment in climate projects, the NDC does not provide for carbon pricing instruments as the prospective tools to achieve these goals (UNFCCC, 2021).

Analysis of core development strategies of Kyrgyzstan demonstrates the country's climate-related ambitions. Kyrgyzstan aims to achieve an image of "negative CO_2 emissions" and "the greenest" country in the region, according to the **National Development Strategy for 2018–2040**. A major policy focus is placed on developing the country's own RES potential and promoting electric vehicles. Development strategies also clearly identify the need to reduce the tax burden and free the market from excessive government involvement.

Kyrgyzstan aims to achieve an image of "**negative CO_2** emissions" and "the greenest" country in the region, according to the National Development **Strategy for 2018–2040**.

In December 2023, at COP28 the President of the Kyrgyz Republic confirmed the climate-related goals previously stated by the country's NDC, and announced **a goal to achieve carbon neutrality by 2050**. The President considers the unlocking of the country's renewable energy potential to be the major instrument to achieve this goal: the country now uses only 13% of the total potential of 142.5 billion kilowatt-hours of electricity (UNFCCC, 2023). The President also announced the development of the **Concept to Achieve Carbon Neutrality in the Kyrgyz Republic**. As of July 2024, the publicly available draft version of the Concept does not directly provide for any option for carbon pricing (Ministry of Natural Resources, Ecology and Technical Supervision of the Kyrgyz Republic, 2024).

The Program of Developing a Green Economy in the Kyrgyz Republic for 2019–2023 suggested such fiscal measures as a carbon tax, although the document did not define the scope of its application (Government of the Kyrgyz Republic, 2022). The same document also listed about 30 subsidies that are considered adverse for the environment and ecosystems by misbalancing the markets and not providing expected support to vulnerable social groups. These subsidies include direct financing of coal and residual coal, and low tariffs for electricity that are considered to hamper low-carbon development. The Program provides for reforming the current approach to these subsidies rather than completely eliminating them. Moreover, it was proposed to introduce green taxes on gasoline and diesel, depending on the intensity of emissions from their combustion. Among other measures, the Program suggests that the financial resources thereby unleashed could be used for "greening" the technologies (Ministry of Natural Resources, Ecology and Technical Supervision of the Kyrgyz Republic, 2024). As of July 2024, no public evidence of implementation of any of the abovementioned climate-related measures provided by the Program is found. According to the UNECE, the fossil-fuel pre-tax subsidy per capita in Kyrgyzstan amounted to US$53.5 in 2020, with an unstable trend over the past five years (UNECE, 2021).

Although there is no evidence of direct actions taken on the political level to introduce any carbon pricing instrument, some interest is expressed in the financial market. In 2023, **the CJSC Kyrgyz Stock Exchange (KSE) and LLC "DiG"** signed an agreement

on joint activities on the development of the market for trading in GHG emission quotas and carbon credits for projects that reduce carbon emissions. Within the framework of the signed document, the parties intend to jointly promote both of these innovative financial exchange instruments in the financial market of Kyrgyzstan. When signing this agreement, the KSE President mentioned the need for a system of regulation of entities, a national register of greenhouse gas emissions, as well as a system of regulatory quotas. By its intention to create a platform for trading GHG emissions quotas, the KSE initiates a voluntary process of CO_2 market creation that in the future could be supplemented by regulatory frameworks from the government side (Kyrgyz Stock Exchange, 2023).

International development organizations promote the introduction of carbon pricing instruments in Kyrgyzstan. For example, SDG7 Roadmap for Kyrgyzstan developed by **The Economic and Social Commission for Asia and the Pacific (ESCAP)** suggests introducing carbon pricing to encourage investments in clean energy. Nevertheless, according to the ESCAP, the price for carbon is assigned only a 5% weight among other 12 criteria in the Multi Criteria Decision Analysis (MCDA) tool (fossil fuel subsidy phased out and fossil fuel phase-out are also weighted at 5% each; the highest weight is given to renewable energy share increase (11%), universal access to clean cooking fuel (10%), energy efficiency increase (10%), alignment with the Paris Agreement (10%), and achievement of the 2030 unconditional NDC target (10%) (UN ESCAP, 2022).

The IMF suggests Kyrgyz Republic climate-related fiscal measures that could improve both the revenue and expenditures sides, e.g., eliminating or reducing tax exemptions, reducing the public wage bill and energy subsidies, introducing carbon taxation. According to the IMF estimates, taxing production and use of fossil fuels could raise up to 6 percent of GDP in additional revenue by 2030. Such measures, however, would need to be paired with a well-targeted social assistance system to protect the vulnerable and promote inclusiveness (IMF, 2023).

Since the country is driven by the goal of mobilizing public and private, international and domestic finance to achieve the SDGs, the **UNDP** in its 2023 Development Finance Assessment (DFA) for Kyrgyzstan suggested a number of measures to address sustainable financing gaps, including by introduction of innovative financing instruments and development of climate financing tools. These could include creating a database of GHG emissions, publishing information on fossil fuel subsidies and emissions in the Kyrgyz Republic, making a plan for a voluntary carbon market, and exploring options for a local carbon market trading system. According to the UNDP, such measures as increasing green taxes and introducing a carbon tax can increase revenues, incentivize capital markets, while improving fiscal resilience. The UNDP suggests developing a concept note on Carbon Market Development, including carbon pricing, carbon tax, carbon credits, and carbon offsets. The Kyrgyz Republic Integrated National Financing Framework Roadmap provides for developing this

concept note in 2025–2027 by the Kyrgyz official bodies, in partnership with the UN. According to the roadmap, such measures as reducing tax exemptions, raising excises on petroleum, and introducing a carbon tax are planned for 2023–2027. In 2025–2030, the Kyrgyz Republic is expected to formulate a Carbon Tax Law and establish a local carbon ETS (UNDP, 2023).

The introduction of carbon pricing instruments could decrease future dependence on international support and uncertainty about its amount, since international support refers to funds that are yet to be mobilized during the implementation period of the NDC (about US$4,298.707 million in 2021 in the energy sector only) (UNFCCC, 2021).

The introduction of carbon pricing instruments could decrease future dependence on international support and uncertainty about its amount

Nevertheless, the current Kyrgyzstan emissions profile and underdeveloped potential of renewable power means that carbon pricing is not a priority instrument of climate policy in the short term. Moreover, the Kyrgyz Republic **export structure** is rather safe in terms of potential exposure to transitional climate risks linked to international carbon policy. For example, Kyrgyzstan is neither mentioned in the Relative CBAM Exposure Index by the World Bank (World Bank, 2023) nor by ADB research on the CBAM's impact and its implications for Asia (Asian Development Bank, 2023). The lack of pressure from the international markets could be one of the key reasons for delaying the introduction of domestic carbon pricing instruments. Since the architecture of climate regulation in the country is in the process of development, such important measures as improving accounting systems, policies, and legislation for **measurement, reporting, and verification (MRV)** would be given a higher priority and become a prerequisite for further financial incentives. Apart from the national MRV system that is yet to be strengthened, such barriers as lack of an institutional framework for implementation and maintenance of a CPI, lack of capacity, technical knowledge, and conceptual understanding of the benefits of carbon pricing instruments are often mentioned. Considering the current approach to tax exemptions and energy subsidies, a premature introduction of a CPI could be opposed by both business and the population (Abdi, G., Zhakiyev, N., Toilybayeva, S., 2023). Meanwhile, according to the UNDP, the effectiveness of carbon pricing mechanisms becomes optimal when these are combined with fossil fuel subsidy reform (UNDP, 2021). There is no evidence of any public discussion involving all the stakeholders on the topic, with international development institutions being most active in promoting this agenda.

Tajikistan

Tajikistani's economy is the least emitting in the region, with the CO_2-intensity of GDP roughly 4% lower than the global average. According to the revised **NDC** adopted in 2021, the unconditional contribution of reducing greenhouse gas emissions in Tajikistan is not to exceed 60–70% of 1990 GHG emissions by 2030. The conditional contribution, subject to significant international funding and technology transfer, is not to exceed 50–60% of 1990 GHG emissions by 2030 (UNFCCC, 2022). In its NDC, Tajikistan admits the lack of market mechanisms for attracting financial resources for climate change issues (renewable energy market certificates, emission trading mechanisms, environmental insurance) (UNFCCC, 2022). The NDC itself provides for sector-specific GHG emissions and lists broad measures such as promotion of renewable energy and improvement of energy efficiency as the Tajik energy sector contributes to roughly 75% of overall emissions (UNECE, 2024). As the country is very vulnerable to physical climate risks, the NDC focuses strongly on adaptation and increasing resilience to climate change impacts (Abdi, G., Zhakiyev, N., Toilybayeva, S., 2023).

Following this narrative, the **National Development Strategy** of the Republic of Tajikistan until 2030 defines energy security and efficient use of electricity as priorities. As of 2024, 98% of the electric energy in Tajikistan is produced from renewable energy sources, mostly hydropower. The National Development Strategy aims to increase the design capacity of the electric power system to 10 GW and ensure diversification of country's electric energy system capacity by 10% at least through the increase of capacities of other energy sources, including coal, oil, gas, and renewable energy sources (Ministry of Economic Development and Trade of the Republic of Tajikistan, 2016). The statistical data demonstrates the efforts of the country in diversification: industrial and residential coal consumption has significantly increased in the past two decades (UNECE, 2024). According to IEA statistics, the share of coal in electricity generation in Tajikistan grew from 44 GWh or 0.3% in 2013 to 1.753 GWh or 8% in 2021 (IEA, 2023). Looking forward to the 2030 horizon, a "greener" structure is expected: according to the President of Tajikistan, the country plans to achieve a 100% share of renewables in electricity production by 2037 (TASS, 2024).

100%
share of renewables in electricity production to be achieved by 2037 in Tajikistan

The Mid-Term Development Program of the Republic of Tajikistan for 2021–2025 does not mention carbon pricing, but refers to development of the **measurement, reporting, and verification (MRV) system** (Ministry of Economic Development and Trade of the Republic of Tajikistan, 2021). The Government of the Republic of Tajikistan has outlined three stages to improve the current MRV system and a transition to an Enhanced Transparency Framework. The first stage is to take

place in 2020–2025, and its main goal is to improve the current methodological and institutional framework for the implementation of the MRV system, with the involvement of key sectors of the economy. The second stage will take place in 2025–2030, and its main goal will be the adoption of a regulatory framework which aims to improve the MRV system of GHGs. The third stage will start in 2030. It is expected that the obligation to submit reports on GHG emissions will be extended to all entities whose emissions surpass 50,000 tonnes of CO_2-eq per year (UNFCCC, 2022). In June 2024, Tajikistan signed a memorandum of understanding with the Initiative for Climate Action Transparency (ICAT) to kickstart a project to support the country in its ongoing efforts to develop a national data framework for climate change. Under the project, ICAT will support Tajikistan to develop and enhance the country's capacity for the preparation of a national inventory of greenhouse gas emissions, and to analyze the effects of national policies to control greenhouse gas emissions. This information will be used by Tajikistan to comply with its reporting requirements under the Paris Agreement, to update NDCs, and to indicate the need for policymaking or –revision (Central Asia Climate Portal, 2024).

The Strategy of green economy development of the Republic of Tajikistan for 2023–2037 visualizes Tajikistan as a country with one of the lowest GHG emissions, and suggests economic and administrative measures to limit emissions, introduce green taxation, environmental fees, and green subsidies. The Strategy also states the need for pricing based on sustainable development principles, including rejection of ineffective financial assistance (subsidies) (Government of the Republic of Tajikistan, 2022). Energy tariffs, notably for electricity and heating, are subsidized in Tajikistan to alleviate poverty, to support large industrial consumers and the agricultural sector (UNECE, 2024). As of 2020, fossil-fuel pre-tax subsidies in Tajikistan amounted to USD 69.2 per capita (UNECE, 2021). According to the ADB, energy prices do not cover the costs of providing energy services and consequently lead to underinvestment in renewable energy deployment, as well as to increased transmission and distribution losses and power outages. This is especially problematic for Tajikistan, given that their most abundant energy source is hydropower, which is very capital-intensive and prone to technical and cost risks. Additionally, subsidized tariffs disincentivize household investment into more efficient equipment and reduce the implementation of energy efficiency policies to drive down end-user energy demand. Tajikistan's government is currently establishing an independent tariff regulator and developing a new tariff methodology intended to incrementally increase energy tariffs, ultimately internalizing the costs of production, transmission, and electricity distribution while not burdening the livelihoods of Tajikistan's population (UNECE, 2024).

To sum up, in terms of the structure of the economy and energy consumption and production, Tajikistan faces more pressure from physical than from transitional climate risks. The absolute amount of GHG emissions in the country is relatively low; hydropower provides the largest share in the energy balance with a potential for further increase. The country aims to ensure energy security and diversification

that could be partially assured by fossil fuels in the short term, but with the prospect of becoming 100% renewable. The country needs investments both to achieve its NDCs and to deal with aging and inefficient energy infrastructure, with many generation and distribution facilities requiring urgent rehabilitation. Investments in energy efficiency are therefore necessary, especially in the residential and industrial sectors, which are the most energy- and carbon-intensive sectors in Tajikistan. Subsidized energy tariffs, however, constitute a barrier to investments in the energy sector, especially to the deployment of alternative renewable energy technologies and energy efficiency. Modern energy pricing mechanisms and policies are required to incentivize investment into the energy sector while not burdening the livelihoods of the Tajik population (UNECE, 2024).

The UNDP suggests that Tajikistan consider carbon pricing and phase out fossil fuel subsidies, or introduce a carbon tax to better reflect the costs of GHG emissions in energy prices. These policy measures to improve fossil fuel efficiency are estimated at considerable or high intensity in all mitigation scenarios developed by the UNDP, meaning that they result in more GHG emissions reduction but at a higher cost (UNDP, 2021). Considering the absence of the MRV system that is expected to become operational only after 2030, introduction of carbon pricing instruments is considered to be premature.

By using hydropower as a primary source of electricity, Tajikistan avoided an estimated

8,64 million

tonnes of CO_2-eq in 2018

Potential sources of investments in energy security and modernization of infrastructure could be found without carbon pricing instruments. For example, in 2024, the Committee for Environmental Protection under the Government of Tajikistan and the Asian Development Bank presented a US$8 billion climate finance plan that aims to achieve the country's NDC and includes both mitigation and adaptation targets (KABAR, 2024). Investments could also come from reconsideration of the current subsidized energy tariffs that constitute a barrier to investment in the energy sector. Tajikistan could also discover opportunities on the international voluntary carbon markets, using its beneficial energy structure. By using hydropower as a primary source of electricity, Tajikistan avoided an estimated 8.64 million tonnes of CO_2-eq in 2018 (Panwar, V. et al, 2022).

Turkmenistan

As stated in Chapter 3, Turkmenistan increased its climate ambitions in 2023 along with its revision of the NDC. The revised **NDC** sets a goal to reduce GHG emissions in 2030 under the BAU scenario by 20% compared to emissions in 2010. The **National Climate Change Strategy** of Turkmenistan contributes to a smooth transition towards a minimal GHG emissions economy, while not interrupting socio-economic progress. The Strategy factors in strong international support and cooperation in achieving its climate goals to provide technical assistance and external financing.

Regulatory and strategic frameworks do not directly identify carbon pricing mechanisms as means of achieving climate goals, as the country has not yet committed to adopting them. According to the Report of the Regional Dialogue on Carbon Pricing (UNFCCC, 2021), country experts did not expect further development of these policy instruments before 2025. The government places straightforward and onsite solutions with expected emission reduction results ahead of any carbon pricing instruments.

While preparing for further fostering of the climate framework and considering carbon pricing mechanisms, the first step to be implementation of the National Inventory System for GHGs along with adoption of MRV guidelines to ensure transparency in its implementation (Abdi, G., Zhakiyev, N., Toilybayeva, S., 2023). This was planned within the **State Energy Saving Program for 2018–2024** (Turkmenportal, 2018). The main measures encompass implementation of contemporary technologies to regulate the volume of pollutant emissions, automated mechanisms for identifying breaches and oversights in primary oil and gas pipelines, as well as a low- and intermediate-pressure gas distribution network. Additionally, modernization of equipment, integration of novel technologies for harnessing associated gases at oil fields, and optimization of oil and gas transportation and utilization consumption metering are included. There is still work to be done on industrial safety and preventing accidents and emergencies with pollutant discharging (The Guardian, 2023). On-site monitoring and prompt response are core not only to prepare grounds for carbon pricing implementation, but also to provide safe production and the population's well-being.

Turkmenistan is a signatory of the **Global Methane Pledge** and has committed to reducing methane emissions by 30% from 2020 levels by 2030 (Turkmenportal, 2023). Despite the relatively small economy, Turkmenistan has the highest methane emissions (7.8 tonnes per capita, Our World in Data, 2022) in Central Asia, primarily derived from subsidies related to oil and natural gas. Given that methane accounts for 41.28% of total GHG emissions in Turkmenistan, the potential for reduction lies with modernization of technology and infrastructure. The primary source of methane emissions is the oil and gas industry, which is key for the national economy of Turkmenistan (UNFCCC, 2022). Before joining the Global Methane Pledge, the Roadmap for 2023–2024 for the development of international cooperation aimed at exploring Turkmenistan's accession to the Global Methane Pledge and the implementation of the Paris Climate Agreement at the national level was approved.

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Significant fossil fuel subsidies would make any carbon pricing inefficient. Turkmenistan accounts for the highest fossil-fuel pre-tax subsidy (US$2,385.5 per capita per year, UNECE, 2022) not only in Central Asia, but in the world. Despite Turkmenistan's

increasing energy consumption trend in the 21st century, efforts are being made to curtail fossil fuel subsidies, yet their proportion remains notably high. The percentage of pre-tax subsidies for fossil fuels (both consumption and production) in the GDP decreased from 25.4% in 2010 to 18.3% in 2021, equivalent to a decline from 7.2 billion dollars to 6.8 billion dollars, respectively (UN Turkmenistan, 2021).

The increase of this quantity is attributed to robust government support to households through the provision of free natural gas, electricity, and water. Households are allocated 25 kWh of electricity and 50 m^3 of natural gas per individual every month. Beyond this allocation, the cost of natural gas stands at a nominal rate of US$0.025 per m^3, which is less than 1 percent of the economic cost of gas. The timeline for the phase-out of this support has been prolonged twice and is now set for the year 2030. Prior to July 2014, fuel for transport was also provided free of charge to vehicle owners (Kojima, 2016). Turkmenistan joined the global stocktake at the UNFCCC COP28 (UNFCCC, 2023), which includes phasing out fossil fuel subsidies that do not address energy poverty or transition (IISD, 2023).

Turkmenistan has vast potential for renewable energy, notably solar and wind, yet the country's institutional frameworks and energy subsidies deter investments in renewable energy. The EBRD's analysis of legal and regulatory frameworks in Turkmenistan concludes that Turkmenistan's institutional structure exacerbates Turkmenistan's dependence on carbon-intensive energy production. Indeed, significant energy subsidies in Turkmenistan crowd out investments into renewable energy production and energy efficiency. Hence, modern energy pricing mechanisms, which reflect the true costs of energy, are required to stimulate renewable energy production and improvements in energy efficiency (UNECE, 2024).

Given the national needs and conditions, it appears premature for Turkmenistan to implement carbon pricing mechanisms, whether in the form of a carbon tax or, even less likely, an emissions trading system. This challenge is predominantly related to the substantial barrier posed by subsidies for fossil fuels. The decision-makers are thus confronted with a dilemma: either to maintain the existing framework or to revise the current social welfare and energy pricing mechanisms to establish market conditions for less carbon-intensive energy sources.

In this context, Turkmenistan ought to concentrate on instituting its own comprehensive system for monitoring, reporting, and verification to establish a comprehensive framework and strategies for emission reduction. Given the localized nature of RES, the considerable potential, particularly in solar and wind energy, and with energy subsidies deterring investments in renewable energy, the institutional framework in Turkmenistan reinforces the country's reliance on energy production with high carbon emissions. Notably, substantial energy subsidies in Turkmenistan impede investments in renewable energy generation and energy efficiency.

Uzbekistan

As mentioned in Chapter 3, Uzbekistan has a well-developed climate regulatory framework, with defined priorities such as RES, energy efficiency and energy transmission, as well as promotion of electric cars, to reach its NDC target of 35% emission reduction by 2030 compared to 2010. Energy sectors are clearly outlined as priorities for climate action. In May 2022, Uzbekistan became one of the 150 signatory countries of the **Global Methane Pledge** and agreed to take voluntary actions to contribute to a collective effort to reduce global methane emissions by 30 percent by 2030 (compared to 2020).

The NDC of Uzbekistan also shapes direction of further development of climate policy, identifying its general strategic directions by 2030:

- Increase the share of renewable energy sources to 25% of total power generation;
- Double the energy-efficiency indicator relative to the level of 2018;
- Halve the energy intensity of GDP.

In this particular scenario, the growth in energy demand is primarily fulfilled through the utilization of fossil fuels, whereas the enhancement in emission efficiency is attributed to the adoption of renewable energy driven by cost factors, a transition from natural gas in both the power sector and heating, enhancements in energy efficiency, and low-cost adoption of electric vehicles. This target necessitates an investment of approximately US$65.2 billion by 2030, and in order to attain carbon neutrality by 2060, annual investments of US$20 billion until 2030 and US$106 billion over the next three decades . The mobilization of such a level of financial resources will require a combination of public and private capital, with Foreign Direct Investment playing a crucial role. Particularly, the private sector will be significantly involved in financing endeavors in the transportation industry, real estate, manufacturing, and the power industry. As mentioned above, the country may overcome its dependence from fossil fuel imports by increased domestic RES generation. Avoiding fossil fuel imports, as a major benefit to the economy, could be as high as US$66 billion (World Bank, 2023).

To attract financing to low-carbon activities, several sources are considered. **The Plan of Measures to Enhance the Effectiveness of the Transition to Green Economy** includes a phase focused on shifting the tax burden from businesses and households to activities that lead to pollution and overconsumption of resources (President of the Republic of Uzbekistan, 2022). This initiative explores the feasibility and potential structure of green

more than
US$100 billion
needed to achieve carbon neutrality in Uzbekistan by 2060

taxation to determine the revenue-generating potential, the socio-economic impacts, and the methods for implementing such a tax. "Green tax" as perceived by the Plan of Measures accounts for a fossil fuel tax and is to be imposed on fuel consumption, while avoiding carbon-intense activities. Such a tax favors consumers of energy that was produced with fewer emissions. This includes renewable energy sources, as well as natural gas compared to petroleum products. Being on the initial development stage, the "green tax" could not be considered as the prerequisite for carbon tax.

Despite the fact that there is no economy-wide net-zero target, the **Carbon Neutrality Roadmap of Uzbekistan's Electricity Sector** (Ministry of Energy of the Republic of Uzbekistan, 2021) was developed with the help of the EBRD and Japanese government. It proposes introducing subsidy reform and a carbon pricing mechanism. This will attract investment to low-emission energy and foster energy security in Uzbekistan. On the other side, the Roadmap sets standards for carbon emission and requires the shutdown of the least efficient facilities, in order to streamline the process of retiring plants with high levels of carbon emissions.

Uzbekistan suffers from persistent **electricity shortages**. Electricity demand is forecast to grow from 61 billion kWh in 2018 to more than 100 billion kWh by 2030. Under these conditions, the country is becoming dependent on imports of electricity and fuel, most often natural gas. Outdated infrastructure leads to high electricity losses, estimated at around 20% of total generation. It is also the cause of frequent power outages throughout the country, damaging economic activity and the well-being of the population (World Bank, 2021). Fossil fuels are subsidized to keep electricity tariffs under control and manage energy consumption. Implicit preferences for carbon-intensive electricity production are publicly recognized and advocated to support energy supply for households. Considering the energy shortage, Uzbekistan seeks low-carbon energy solutions. RES power plants are localized and energy storage has restrictions on geographical scope, which opens possibilities for energy generation to cope with the local demand.

The government sets **prices for energy resources** based on regulated prices and tariffs, taking into account specific consumption rates for generating 1 kWh of electricity plus equity dividends, loan interest, and other components, without restrictions on the rate of return. This does not create incentives for optimizing costs and reducing losses. At the same time, Uzbekistan eliminated motor gasoline and diesel fuel price tariffs, leading to the exclusion of subsidies for oil products from consideration (UNDP, 2023).

According to the UNDP, during 2019–2021 **direct government fossil fuel subsidies** accounted for around US$68 mln and the amount for all oil and gas electric power and heat and power industries was 3.56 times more (US$310 mln). **Tax expenditures** (tax exemptions and underpricing of goods and services) for the fossil fuel sector amounted to US$729.91 mln and are subject to reduction by government. The UNDP estimates **price subsidies** (the negative difference between domestic and export sales prices) to be more than US$11,098 mln, of which US$9,592 mln goes for natural

gas and US$1,064 mln for electricity (UNDP, 2023). Nevertheless, in the reviewed period, there is a noticeable downward trend in indirect fossil fuel subsidies (tax exemptions and price subsidies) across all categories, while direct government support to producers does not show any straightforward reduction.

It is acknowledged that extensive government involvement in the electricity market poses a significant obstacle to carbon pricing. Without market liberalization, carbon pricing signals will not be communicated properly to the existing fossil fuel power plants. Energy producers understand and evaluate the ever-increasing demand for electricity and importance of household energy security to the state, so they expect to receive government support despite efforts at climate action to reduce emissions. Price signals that are not working properly diminish the effect of carbon pricing and prevent the creation of competitive conditions to strengthen the market share of renewables. The current reform of the electricity market, which involves the creation of a new Law on Electricity, presents a distinctive chance to incorporate the missing sustainability aspect into the legal and regulatory framework. For now, there is no evidence that a carbon pricing mechanism will be included in the revised Law on Electricity.

The **Innovative Carbon Resource Application for Energy Transition Project for Uzbekistan (iCRAFT)** was launched by the World Bank in 2023 through a US$46.25 million grant and will contribute significantly to establishing a carbon pricing mechanism (World Bank, 2023). Until 2028, iCRAFT will allocate grant funds on an annual basis to incentivize energy subsidy reforms that result in specific reductions in emissions. Forecasts indicate that Uzbekistan has the potential to diminish approximately 60 million tonnes of CO_2 throughout the duration of iCRAFT, of which the around 2–2.5 million tonnes of CO_2 will be realized within the project . Utilizing the frameworks and methodologies established and validated within the project, Uzbekistan will have the opportunity to sell the surplus emissions reductions in global carbon markets. While the program aims to dispose of carbon credits in the global market and to include Uzbekistan in the global carbon trade, it will also contribute to the institutionalization of carbon pricing and encourage producers to understand global climate trends and future business implications.

Forecasts indicate that Uzbekistan has the potential to diminish approximately

60 million

tonnes of CO_2 throughout the duration of iCRAFT, of which around

2–2.5 million

tonnes of CO_2 will be realized within the project.

Uzbekistan lacks the most important tool for the implementation and further development of carbon pricing, namely a monitoring and reporting system. The Plan of Measures to Enhance the Effectiveness of the Transition to Green Economy implies the introduction of a modern monitoring, reporting and verification (MRV) system for climate change, covering all GHGs in the economy. The MRV infrastructure is still under development, even though it was scheduled to be launched on 1 January 2024.

adjusting prices and introducing carbon pricing combined can create as much as

5 percent of GDP

worth of additional fiscal space over the transition period

To sum up, Uzbekistan has set moderately ambitious climate goals and taken steps to achieve them. The focus of these measures is the energy sector, which is at a crossroads: on the one hand, high fossil fuel subsidies are an obstacle to any carbon pricing mechanism; on the other, the government is taking steps to prevent tariff increases due to energy shortages that put the population's welfare in a vulnerable position. Despite the ambiguity of impacts of carbon pricing on economy, Uzbekistan has steadily built infrastructure and institutions for such mechanisms to be introduced. Macroeconomic modelling suggests that adjusting prices and introducing carbon pricing combined can create as much as 5 percent of GDP worth of additional fiscal space over the transition period (UNDP, 2023). Some studies point out a noteworthy detail, that carbon pricing could be applied to specific gases and sectors, e.g., to methane emissions in landfills, to N_2O in industrial operations, and to fluorinated gas emissions (UNFCCC, 2021).

5. Carbon Pricing Introduction: Evaluation for Selected Countries

As discussed in previous chapters, the Central Asian countries and Azerbaijan differ in their current climate policies design, and are marked by different approaches to introducing carbon pricing instruments. While all of the reviewed countries have pledged to reduce emissions, their approach, willingness, and readiness to move to specific carbon pricing instruments, in particular carbon taxation and emission trading systems, are strikingly different. Some of the countries are already taking steps towards the introduction of a carbon price, while others are including it in their statements of strategic climate policy priorities. The reasons for both common and different practices lie in the overall state of the economies in the region and in the structure of greenhouse gas emissions, such that some factors defining a country's readiness to introduce carbon pricing should be examined in more detail.

5.1 Developing a Readiness Assessment Tool for Carbon Pricing

In order to assess the readiness of countries to introduce carbon pricing mechanisms — whether a carbon tax, an emissions trading system, or a combined instrument — it is proposed to create a universal tool that consists of questions addressing different dimensions of the issue, namely: the importance of carbon pricing for achievement of national climate targets; the country's readiness for fiscal climate regulation; and the potential effectiveness of such an instrument in the national context.

By evaluating **the importance** of a CPI for the country, the following issues are addressed: general state of the economy, structure and sources of GHG emissions, and climate policy targets and priorities. General characteristics of the economy underscore economic effects, carbon leakage risks, growth constraints, distributional consequences, competitiveness loss, and political hurdles. The analysis of these issues aims to define the factors that advocate the need to introduce carbon pricing. Climate targets and commitments are used to define whether the primary benefits of CPI (such as low-cost emissions reduction and raising climate-related revenue) correspond with the country's economy-wide strategies (Partnership for Market Readiness, International Carbon Action Partnership, 2021).

Readiness criteria cover the issue of a minimal cost to introduce CPI, as well as supportive factors in the national context to foster CPI introduction. The corresponding questions address what elements of CPI have already been introduced by the country and what elements of the current policy mix may create challenges to CPI development. In case some of the CPI elements are already in place, introduction of a comprehensive instrument would go much more smoothly compared to economies subsidizing

carbon-intensive industries or preventing any additional taxation. Public perception of and academic interest in carbon pricing also lay the groundwork for institutional introduction of carbon pricing. General policymaking capacity refers to the ability of administrative institutions and staff, and the innovative practices needed to execute a CPI.

Effectiveness refers to institutional factors that may impact CPI performance in practice. The experience in execution of similar instruments (not only climate-related) may facilitate achieving targeted effects on the economy and environment, or hinder the real results of the pencil-to-paper policy.

The Readiness Assessment Tool is structured from general questions to more target-specific ones, each of them helping to define the countries' predisposition for change and providing recommendations for CPI design.

1) What are the key sectors contributing to GDP? Which sectors are the main drivers of economic growth?

The CPI should be impactful enough to drive economy-wide low-carbon transition, while it should not threaten the country's economic growth and competitiveness, especially in developing countries that are in focus of this research. Understanding of the key sectors would define the country's strengths and vulnerabilities in terms of future low-carbon transition.

Carbon pricing may first target sectors and activities with a relatively small share in GDP in order to set clear boundaries of the instrument and to distinguish the obvious effects of the instrument from related effects and other policies. On the other hand, the CPI may cover complex sectors that are interdependent with the whole economy and contribute significantly to the GDP in order to create multiplicative effects of carbon pricing.

2) Which sectors have the most foreign trade?

Such a phenomenon as "carbon leakage" carries the risk that the carbon pricing instrument will not be effective at all.

This question targets sectors with the highest share in trade flows and trade balance, which are mostly vulnerable to carbon leakage. When imposing a carbon tax on sectors with a high share in exports or covering those with an ETS, costs of these goods rise and competitive performance worsens, making imported goods more attractive. This may significantly strike domestic producers and, consequently, put job creation under risk. The other side of this problem is that goods that are entering the country would not be under carbon regulation, or producers would move manufacturing out of the jurisdiction of the CPI. Such a phenomenon as "carbon leakage" carries the risk that the

carbon pricing instrument will not be effective at all. For export-oriented goods, the vulnerability is expressed in the need to adjust to the regulation of target markets, which, as in the case of the EU, may apply their own carbon regulation. EU permits crediting compliance with carbon regulations within the producing country if it is comparable to the European benchmarks. So, instead, producers can comply with national legislation, contributing to the country's budget, which could be then spent on development projects and low-carbon solutions to benefit the population. Otherwise, the company faces higher transaction costs, bureaucracy, and additional payments to the export market.

The CPI will be most welcome for sectors with production and consumption concentrated within the country's borders, i.e., with a low share in the trade balance. For export-oriented sectors, everything will depend on the direction to which the goods are traded and the climate policy in that country.

3) What is the current electricity generation mix?

Electricity generation ranks among the sectors characterized by significant interconnectivity, implying substantial multiplier effects on the economy. As described in the previous chapters, this sector is often responsible for the highest share of GHG emissions in their structure, thus becoming an obvious subject for CPI coverage. If the share of fossil fuel-based generation is comparatively high, the compliance costs that the power sector incurs also rise, leading to higher prices for electricity consumers. This factor should be carefully considered when formulating policies to support the carbon regulations. Applying CPI to a power sector with a predominant share of renewable energy sources in electricity generation would not lead to a significant effect in terms of GHG emissions reduction.

4) What are main GHG emitting sectors in the economy?

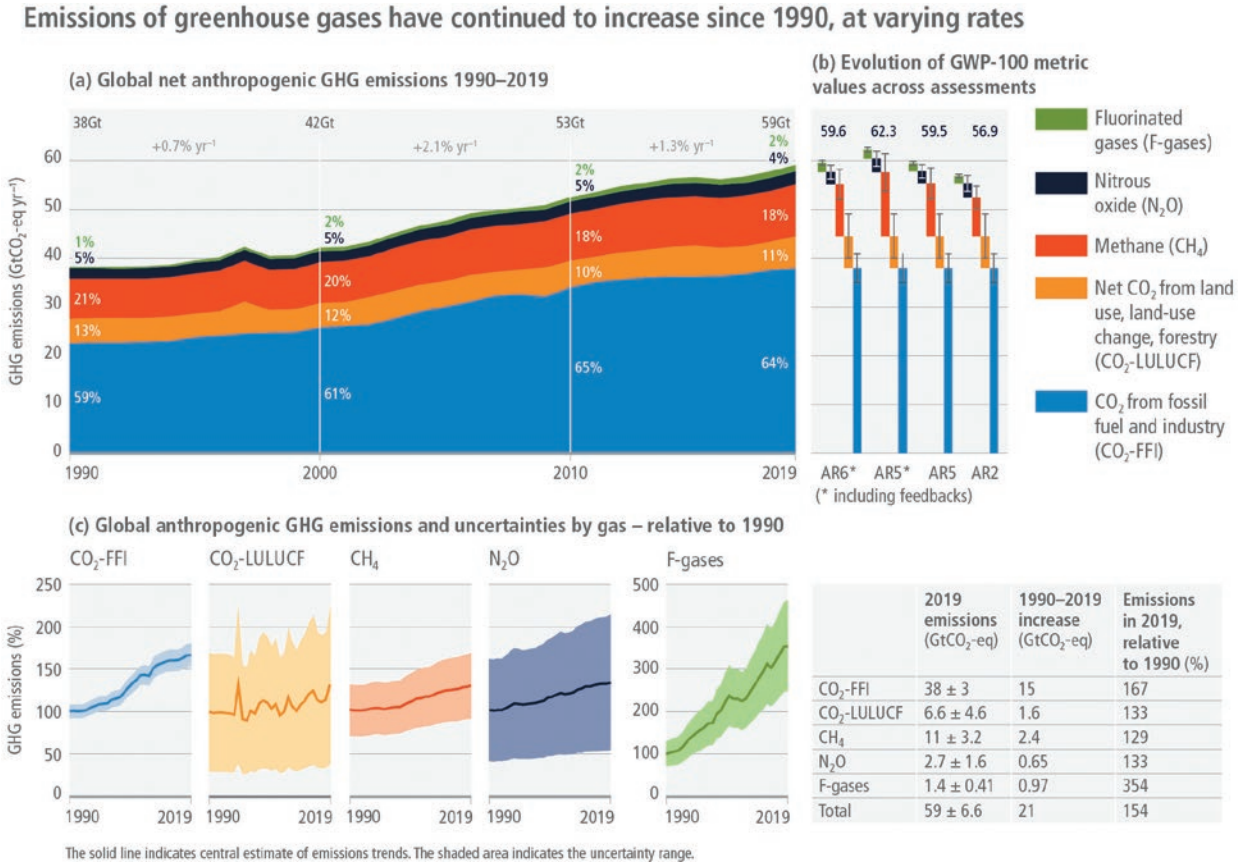
The most efficient approach would be to impose a CPI on sectors with a larger share in the emission structure, since it would significantly reduce emissions and enhance the tax base / turnover of tradable quotas. At the same time, the most emitting sectors could appear to be the largest contributors to GDP, thus indicating a high carbon intensity of the economy and the need to make a fundamental technological shift to less carbon-intensive solutions. In this case, the greater the share of that sector in the economy and its social importance, the more sensitive will be the introduction of carbon regulation, which increases the marginal cost of production.

5) What are the major gases in emissions structure?

As expected, carbon dioxide (CO_2) accounts for the largest share of emissions, as globally this gas accounts for the majority of emissions (75% vs. 18% for methane (CH_4), 4% for nitrous oxide (N_2O), 2% for fluorinated gases (F-gases) (See Figure 23)).

Although CO_2 accounts for the largest share of emissions globally, the structure of all GHG emissions matters, as it defines the key pressure points in terms of carbon intensity, pointing to the focus of the future climate policy. Gases also differ in their Global Warming Potential (GWP) — their ability to absorb heat and persistency in the atmosphere, so reducing some may have a greater effect on curbing global warming than reducing others. Gases with high GWP include methane and nitrous oxide. For example, in countries where the oil and gas sector accounts for a large share of GDP and methane accounts for a large share of emissions, climate policy should include methane.

↓ **Figure 22. Global Anthropogenic GHG emissions, 1990–2019**



	2019 emissions ($GtCO_2$-eq)	1990–2019 increase ($GtCO_2$-eq)	Emissions in 2019, relative to 1990 (%)
CO_2-FFI	38 ± 3	15	167
CO_2-LULUCF	6.6 ± 4.6	1.6	133
CH_4	11 ± 3.2	2.4	129
N_2O	2.7 ± 1.6	0.65	133
F-gases	1.4 ± 0.41	0.97	354
Total	59 ± 6.6	21	154

Source: IPCC, 2022.

6) What is the NDC target of the country?

The NDC represents one of the major climate commitments the country is making. Being a universal and comparable goal adopted by the countries, the NDC allows comparison of policies required for its achievement. The level of GHG reduction target directly affects the design of the climate policies, including implementation of a CPI. For those countries that, due to their national circumstances, are not moving fast enough to achieve the NDC, a CPI can be a solution.

All the NDC variables could influence the decision on CPI introduction and its design: both the level of emissions to be reduced and the timeframe for this reduction. CPI parameters (such as scope, price, and amount of free allowances if there is an emissions trading system) could be adapted over time considering specific conditions, achieved progress, etc. Thus, carbon pricing could be considered applicable for long-term NDC targets by setting an institutional infrastructure of motivation for emission reductions by individual emitters.

7) Does the country have a carbon neutrality (net-zero) target?

In addition to the NDC, countries set additional national climate targets, with a carbon neutrality target being the most ambitious for high-emitting countries. A more ambitious target requires more robust measures, including consideration of fiscal carbon instruments in the climate policy mix. In addition to longevity of CPI aftereffects, it fosters implementation of low-carbon solutions by individual entities. If such a task is set, a country shows sufficient appetite for carbon pricing.

A more ambitious target requires more robust measures, including consideration of fiscal carbon instruments in the climate policy mix.

8) Does the country have a conditional target subject to international financial support?

Some of the countries under consideration set both an unconditional GHG emission reduction target and a target subject to additional international financing. In the latter case, the introduction of CPI could provide an important source of climate-related funding, thus decreasing dependence from international support and securing achievement of a more ambitious target by their own means. A CPI can generate revenues from taxes and auctioning of emission allowances, which then could be channeled into a specialized fund to finance low-carbon solutions. In this way, financial flows are concentrated in the country, preventing financial capital flight.

9) Does the country have a fossil fuel subsidy elimination target? If yes, how it will be achieved?

The CPI and fossil fuel subsidies are fundamentally distinct mechanisms. Subsidies can be categorized into explicit and implicit forms. Explicit subsidies are manifest when the retail price of a fuel is lower than its supply cost. Implicit subsidies occur when the retail price omits external costs, which encompass the standard consumption tax, social and environmental externalities. Subsidies may be represented through direct fiscal transfers, induced transfers (price support), tax expenditures, and transferring risk to the government. Moreover, quantifying the size of fossil fuel subsidies poses significant challenges: the definitions provided by the WTO, OECD, IEA, and IMF differ considerably in terms of their scope and base value. The elimination

of energy subsidies has the potential to reduce the projected carbon tax. Consequently, the IMF advocates for the simultaneous implementation of both strategies — systematically phasing out all fuel subsidies to facilitate more efficient fuel pricing, and concurrently instituting a carbon tax.

Eliminating fossil fuel subsidies could be one of the prerequisites for future successful CPI introduction.

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Eliminating fossil fuel subsidies could be one of the prerequisites for future successful CPI introduction. If the country sets a target to phase out or eliminate such subsidies, it could be a sign of efforts to shift towards more sufficient allocation of resources while using the revenue gain for better targeted social spending, reductions in inefficient taxes, and productive investments. On the contrary, in the absence of willingness or readiness to eliminate fossil fuel subsidies, introduction of any CPI could be considered fruitless.

10) What is the aggregate relative CBAM exposure index of the country?

The EU Carbon Border Adjustment Mechanism (CBAM) will enter into force on January 1, 2026 after checking this mechanism in practice, whereas pilot transition period started in October 2023. The CBAM covers iron and steel, aluminum, cement, fertilizers, and electricity, and requires the purchase of CBAM certificates that report direct and indirect carbon emissions of these goods. The CBAM could have a significant impact on the competitiveness of developing countries that mainly export these goods to the EU.

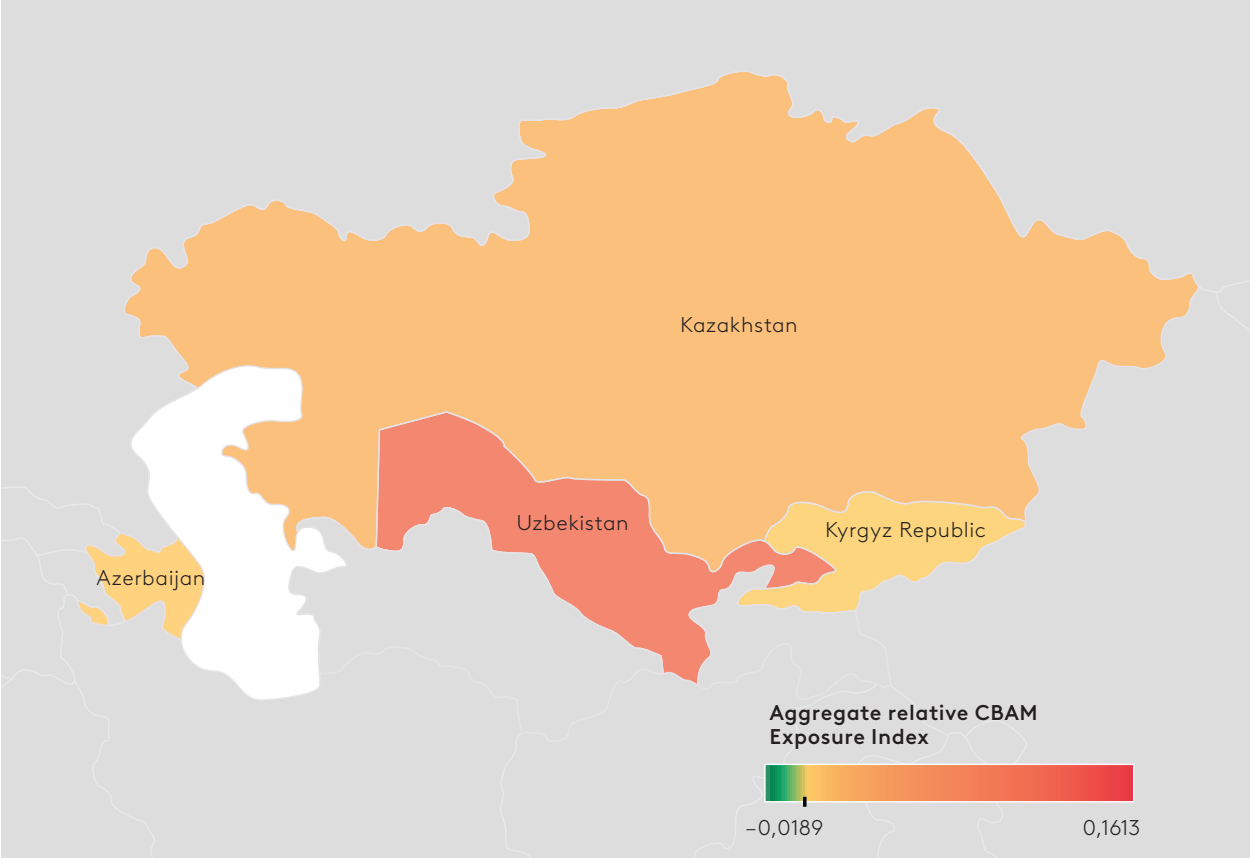
Exporters are forced to pay additional funds to the export market basket for "imported emissions". The CBAM mechanism implies the possibility of offsetting emissions if their value (in the amount similar to CBAM certificate rate) was paid at least partially in the country of production. The state is able to keep these funds within its budget, prevent them from leaking into the export market budget, and to spend them on development projects.

To calculate CBAM risk exposure, the World Bank's Relative CBAM Exposure Index (World Bank, 2023) is used. It combines carbon emissions intensity and exports of CBAM products to the EU at the country-level, while taking carbon price at the level of 100 USD per metric tonne and a CBAM certificate rate similar to the one paid by domestic producers. It acknowledges fluctuations in costs within the European Union market, wherein EU producers also incur costs related to emissions, thereby allowing comparatively greener exporters to enhance their competitive edge notwithstanding the obligation to acquire certificates. The aggregate relative index signifies the trade-weighted relative vulnerability across all products subject to CBAM. For a specific industry, the CBAM exposure index is assessed by multiplying national exports' share of the CBAM-associated product directed towards the EU

and the carbon cost per dollar of exports to the EU, which is influenced by the carbon emissions intensity of production and the estimated expense of the CBAM certificates.

The variables make it clear that the larger the share of the country's exports is of carbon-intensive goods traded with the EU, the higher is the CBAM risk exposure. On the other hand, if a large share of exports to Europe consists of low-carbon goods or if exports to Europe are not large, CBAM risk exposure will be lower. In case of comparatively high CBAM risk exposure, the introduction of a domestic CPI can serve as a protection tool.

↓ **Figure 23. Relative CBAM Exposure Index, Central Asia and Azerbaijan**



Source: World Bank, 2023.

11) Does the climate policy focus on mitigation or adaptation measures?

Two major areas of activities delineate the characteristics of climate policy. Mitigation is aimed at the reduction of greenhouse gas emissions in order to maintain global temperature increases within predetermined thresholds. In essence, mitigation represents the struggle against climate change and the elimination of its anthropogenic causes. Conversely, adaptation pertains to the strategies aimed at adapting the economy to the future impacts of climate change. These components are neither comprehensive nor inherently contradictory. While various international organizations and certain nations are proactively addressing both facets of climate policy, others are opting to prioritize one over the other.

The trajectory of climate policy is shaped by the general economic conditions as well as country-specific climate vulnerabilities and prospects. For instance, nations that do not contribute significantly to greenhouse gas emissions but are exceptionally vulnerable to climate change due to insufficient access to potable water, or that possess a considerable capacity for natural carbon dioxide sequestration (attributed to extensive forested areas) tend to advocate for adaptation strategies. In contrast, countries with advanced industrial sectors, developed research and development, and greater capacity to curtail emissions through less carbon-intensive technologies are more likely to pursue mitigation measures.

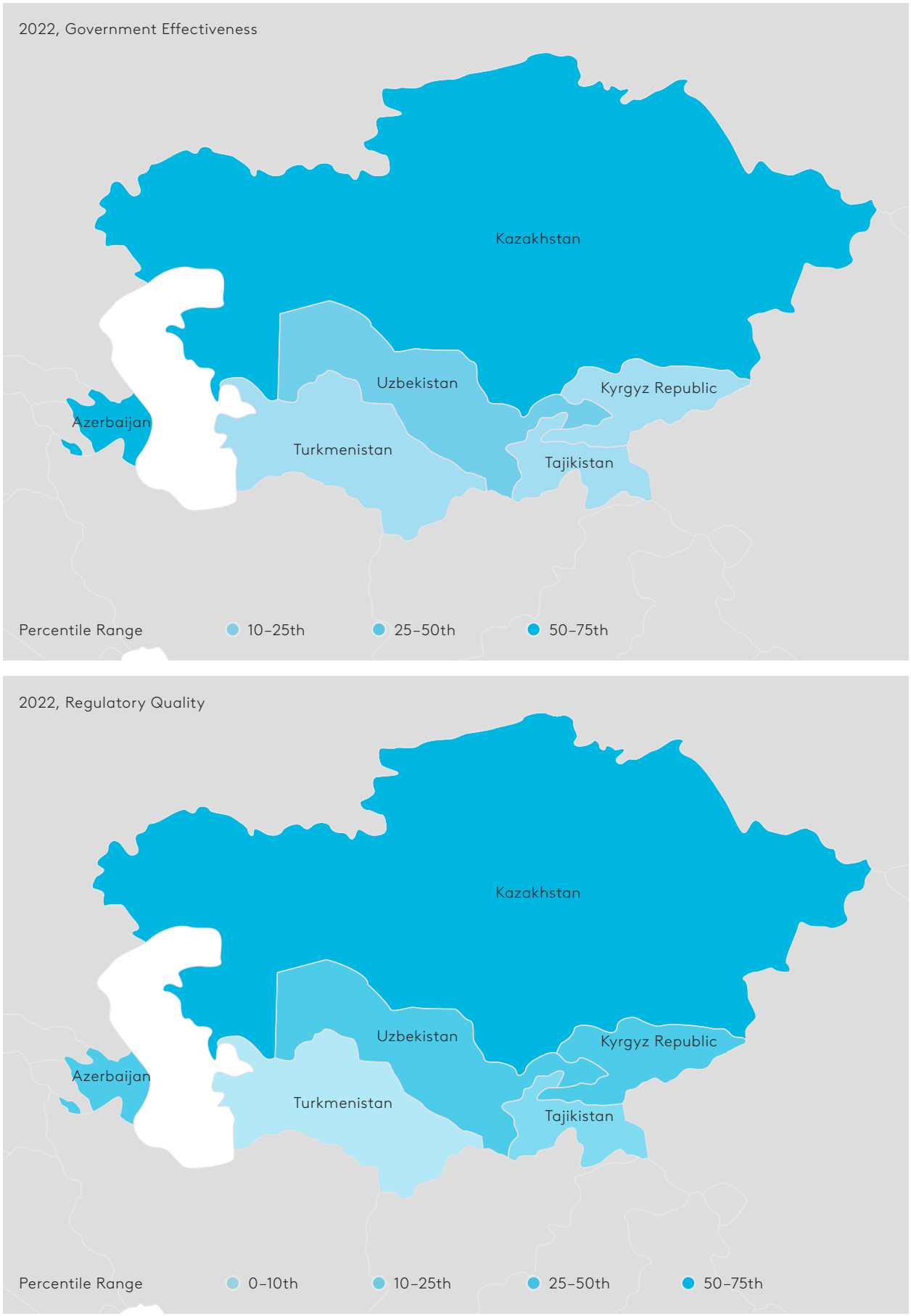
In CPI terms, this means that countries with a mitigation focus are more likely to be able to implement carbon pricing as a natural fit with other mitigation policies aimed at GHG emissions reduction. The reason lies not only in the political buy-in from stakeholders, but also in the absence of contradiction or inefficient allocation of resources between policies.

12) What are the Regulatory Quality and Government Effectiveness Indexes (including policy quality and regulatory sufficiency) of the country?

The quality of public administration is key to the responsiveness and consistency of policy formulation, as well as to the quality of the implementation of formal policies in practice. This includes the quality of public services, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Effectively applied policies are sustainable and implementable, allowing them to create meaningful and expected results year on year. Good governance ensures that policies are enforced and that non-compliance is penalized. If policies aim to create market conditions, the government ensures a level of its intervention to create infrastructure and institutions for market agents to operate freely.

To evaluate this, two indexes are proposed for analysis: the Regulatory Quality Index and the Government Effectiveness Index developed by the World Bank as part of the Worldwide Governance Indicators. Regulatory quality reflects perceptions of the government's ability to develop and implement sound policies and regulations that enable and facilitate private sector development. It also includes the absence of undue burdens on normal business operations due to the regulatory framework and the absence of increased risk of fines and penalties for non-compliance with the tax code, as well as the availability of subsidies and the effectiveness of competition regulation. This also covers regulatory compliance and bureaucratic inefficiency and/or lack of transparency. Government effectiveness, on the other hand, reflects perceptions of the quality of public services and the degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to the policy. This indicator includes the complexity of the bureaucracy and the accessibility of public infrastructure.

↓ Figure 24. Worldwide Governance Indicators, 2022



Source: World Bank, 2022.

13) What is the scope of coverage of the existing policy (sectors and gases)?

An analysis of the main targets of climate regulation will reveal two characteristics of climate policy: which activities are considered as a regulatory priority (due to low regulatory costs or importance for meeting commitments) and which activities have regulatory gaps. If there is well-developed regulation for a particular activity and greenhouse gas, the costs of additional reductions and incentives are relatively low. On the contrary, if there are significant gaps in regulation, e.g., if a large share of GDP is attributed to emission-intensive activities that are not subject to regulation due to high costs of additional regulation or weak government control over emitters, this is an area that should be prioritized for future regulation.

14) Which characteristics relate to the climate policy mix in relation to potential fiscal management?

A specific climate policy instrument — in the case of the subject of this study, carbon tax, ETS or a combination of these instruments — should first and foremost fit naturally into the overall climate policy mix. The instrument should not divert resources from other priorities, nor should it duplicate them. New instrument should either close regulatory gaps, or contribute to meeting more ambitious climate commitments. Thus, the mix of climate policies in relation to CPI can be characterized as:

- Complementary — these policies contribute to the carbon market or broaden the carbon tax base by, for example, implementing market reforms and reducing government presence in the market, improving monitoring, reporting, and administrative infrastructure.

- Overlapping — policies repeat the functions and objectives of CPI by diverting resources and dispersing them among different instruments. Examples of such policies are trading auctions of green certificates for electricity, feed-in tariff programs, and a green tax for hazardous emitters.

- Countervailing policies oppose incentives in carbon pricing. These policies include the fossil fuel subsidies mentioned above, as well as industrial tax credits and other subsidies for carbon-intensive activities.

15) In what sectors and for what gases are companies obliged to account for emissions according to national legislation?

An objective, accurate, and uniform accounting of the emissions attributed to each emitter serves as a crucial foundation of a carbon pricing mechanism. Consequently, science-based emission quotas or meticulously calculated emissions taxes, accompanied by projected effects on the economy and the environment, are the outcomes of an effective monitoring and reporting framework. Measurement,

reporting, and verification (MRV) is essential to any CPI, and the preparedness of the MRV system will be a determining factor in the timeline for the deployment of the CPI (Partnership for Market Readiness, International Carbon Action Partnership, 2021).

Setting MRV requirements at an early stage is vital due to the multitude of components that must be conveyed to stakeholders and the significance of MRV in executing other policy elements, such as allocations in the case of ETS. Frequently, existing fuel taxation frameworks or other environmental regulations could be utilized as the basis for developing contextually suitable MRV systems. The provision of comprehensive methodologies and guidance for regulated entities is key to enhancing adherence to the MRV framework. Monitoring encompasses the quantification of emissions through either calculation or direct measurement, which must subsequently be compiled into an emissions report. Typically, these reports are then subjected to verification by independent service providers (verifiers) or through auditing companies.

16) In which carbon trading mechanisms provided by the Kyoto Protocol / Paris Agreement does the country participate?

Country involvement in international frameworks or practices related to carbon trade reflects extensive experience in emissions trading. At the turn of the century, global political focus transitioned towards climate, prompting some nations to try out GHG emissions trading. The 1997 Kyoto Protocol set forth guidelines for emissions trading among its signatories. Initial adopters (Norway, the EU, and New Zealand) utilized this experience to develop their own ETS, while other nations (Japan), established independent regulatory frameworks to fulfill Kyoto commitments. This agreement initiated two mechanisms: the Clean Development Mechanism (CDM), allowing developed nations to finance mitigation in developing countries, and Joint Implementation, enabling developed parties to account for each other's project implementations. Subsequently, the methodology for trading emission reduction units was codified in Article 6 of the Paris Agreement in December 2015 (Partnership for Market Readiness, International Carbon Action Partnership, 2021).

17) Was a framework for offsets established in the country?

The incorporation of offsets represents the willingness and efforts of the country to market its climate projects, yet it is not a prerequisite for the effective functioning of an ETS. Nevertheless, offsets at some point are generally accepted within the existing ETS frameworks. The mechanism of offsetting allows emissions from regulated sources to surpass the established ETS cap, while emissions are reduced or sequestrated from other sources. Offsets may be sourced domestically within uncovered sectors, or externally. Allowing offsets may make the ETS more attractive for private sector stakeholders by mitigating compliance expenses (Partnership for Market Readiness, International Carbon Action Partnership, 2021).

The motivations for the establishment of offsets infrastructure may encompass more ambitious climate objectives, shifting towards targeted climate initiatives (such as improved air quality, the rehabilitation of degraded landscapes, reforestation efforts, and improved watershed management), or the broadening of carbon regulation to encompass previously uncovered sectors. Having a framework for offsets will show to what extent the country is ready to develop MRV and to impose an accounting obligation on emissions. Thus, offsets, if implanted in the CPI, may mitigate the effects of carbon pricing on the economy to some extent.

Mandating that offsets be sourced domestically is one dimension of carbon pricing architecture that can promote investment in initiatives that support domestic environmental equity and extend more broadly across the economy (Partnership for Market Readiness, 2021).

18) Are institutions (e.g., environmental regulators) in place that could administer a CPI?

When implementing a CPI, a country must consider the national and jurisdictional context. This determines the type of CPI that can be implemented and the speed at which it can be implemented. For example, administrative offices that are overburdened with tasks and responsibilities, and lack the necessary competencies and capacity, may not be able to develop and implement a CPI. On the other hand, when there is an overabundance of government agencies, their coordination is challenging. An existing regulator may have more capacity to administer and enforce CPI policies and processes. National institutions are responsible for developing rules and methodologies, issuing loans, supervision and enforcement, and project appraisal.

When we speak of forms for regulatory bodies to support CPI implementation, we are considering the Specialized Cross-functional Working Group, Committee, Agency or the Ministry of Environment (if responsible for fiscal measures) or the Ministry of Economics (if responsible for Sustainable Development) of the country. Depending on the level of responsibility in the hierarchy to which climate mitigation issues belong, both the degree of control over CPI actors and the scope for increasing climate ambition may vary. The CPI must be implemented in clear linkages with the overall development strategy, with general economic policy, climate policy, and specific climate targets.

19) Is regulation on CPI in process?

When a country considers itself ready to embark on CPI development, relying on existing institutions where possible will help control costs. ETS pilot projects can generate valuable experience, but they also risk leaving a legacy of negative public perception if they encounter difficulties, and not all lessons learned may be applicable when the ETS is fully operational. Phased implementation of ETS can ease the burden

on institutions and sectors, but can reduce the ETS's initial environmental impact and stakeholder expectations for future ambitions. Providing a predictable review of terms and conditions can generally reduce uncertainty, a major barrier to low-emission investment, but additional unanticipated changes may be unavoidable.

20) Was a public entity-level GHG emissions registry established?

While MRV represents a comprehensive framework that integrates methodologies for data acquisition and standardization, in conjunction with institutional governance mechanisms, the resulting product of MRV is data registry. A robust MRV framework, coupled with strong enforcement principles and a well-designed registry, fosters both accountability and transparency within the system.

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Regarding both ETS and carbon taxation, registries are crucial for the transparent disclosure of information and for communicating the environmental and financial outcomes of these policy frameworks. Record-keeping holds particular importance within the ETS, primarily due to its decentralized architecture: registries reflect how many allowances were issued and for whom, their serial numbers, who holds them at the moment, as well what allowances have been surrendered or annulled. The processes of transaction tracking, compliance monitoring, and report submission facilitate the establishment of a thorough and extensive database.

Policymakers are presented with the choice of developing such a database from the ground up or leveraging existing data consolidation frameworks designed for alternative purposes as a model, while still maintaining oversight of their own registry. The registry could be available either for users and market participants (companies) only, or for the general public. The public accessibility of these registries promotes accountability, mitigates the risk of fraud, and incentivizes enhanced ambitions and efforts by publicly tracking advancements towards national climate commitments (Partnership for Market Readiness, International Carbon Action Partnership, 2021).

The granularity of information made publicly available within the registry depends on data security considerations and the readiness of corporations within a specific country and sector to publicly disclose information. One significant advantage of such disclosure is to showcase the leading entities (champion companies) that are driving the climate agenda within the industry.

21) What is the general public's support of policies and regulations for the CPI?

Public support for the CPI influences the following variables of ETS or carbon tax implementation: more extensive scope, more rapid pace of implementation,

and higher effectiveness. Public support comes from a general understanding that the goal of reducing emissions is important and takes its place in the country's long-term development strategy. The public is more predisposed to carbon pricing instruments if clear and transparent information about the specific benefits and costs of the instrument for nature, society, and the economy has been communicated to them.

Public support can influence the reputation of companies: for those that participate intensively in carbon trade, their reputation rises; those that are accountable but avoid the use of the publicly endorsed instrument are subject to naming and shaming penalties. In addition, higher climate ambition and broader coverage of applicable instruments becomes available through public endorsement.

Nonetheless, since society is multi-polar and views on CPI will almost certainly differ, it is important to understand the extent to which this will affect policy implementation or whether resistance can be overcome. Thus, if the majority in society is in agreement and the policy is successfully implemented; or if the policy is not implemented despite positive public perceptions, public support can be assessed as "high". If the policy is implemented despite occasional reports of public resistance or expressions of dissatisfaction, public support is assessed as "limited". If the publicity clearly opposes the CPI or the issue is not publicly discussed at all, public support is "low".

For example, preferences for one of the CPIs may be implicit and expressed not in relation to a particular instrument, but to the policy approach itself. For example, some countries are characterized by a general rejection of increasing the tax burden on households and firms. In such a case, a carbon tax is not seen as an acceptable solution.

22) Have international organizations and the academic community provided assessment or assistance (technical, analytical, etc.) to the country in regard to CPI / carbon regulation / fiscal climate policy?

Among the important indicators affecting the implementation of a pricing instrument are the understanding, skills, institutions, processes, and resources required for policymakers, businesses, and executors. Capacity-building helps to overcome many of the short-term constraints related to noncompliance, extra costs, trust issues, and administrative burden. Education and stakeholder outreach and engagement offer the opportunity to increase capacity, which means jurisdictions can focus on longer-term policy objectives and considerations. Means to improve capacities of stakeholders include developing guidelines, holding workshops and events, running ETS simulations, engaging researchers, and encouraging learning from other systems (Partnership for Market Readiness, International Carbon Action Partnership, 2021).

Important channels to provide capacity-building are academic circles and international institutions. While researchers and think tanks may investigate science-based effects for potential design of carbon pricing in the country, international organizations are

capable of financing projects, providing technical assistance, and holding conferences. Thus, the number of academic papers on CPI determines the interest of the scientific community and the presence of the country's own experts who are ready to develop skills and knowledge. Also, countries that have had experience with institutions such as the World Bank, PMR, ICAP, GGGI, etc. on issues of fiscal carbon regulation in general or for some of its elements, can use the accumulated experience to create a CPI and avoid mistakes at the initial stages.

The EAEU is also developing common approaches to carbon regulation, including carbon pricing within the High-Level Working Group. Since some of the countries in the scope of this research are already EAEU members and others are considering joining, the results of the EAEU work on climate agenda would influence their national policy approaches.

International capacity-building could also influence the choice of the specific CPI. In case of country interest and willingness to introduce a CPI, but lack of experience and expertise, carbon price, being a simpler instrument, could be a preferable option. An ETS requires strict adherence by market participants to methodologies and guidelines, which entails high compliance costs in the first stages of implementation.

5.2 Assessing Countries' Readiness for Introducing Carbon Pricing Instruments

Using the Readiness Assessment Tool, six countries in the scope of this research have been assessed. The key purpose of this exercise is to define whether the introduction of a carbon pricing instrument would bring more benefits or costs, according to the existing and expected policy frameworks, practices, and general state of the country's economy. The full description of the Readiness Assessment Tool applied to each country in the scope of this research is in the Annex.

As previously discussed, the country's readiness for introducing carbon pricing policy is defined by a number of conditions including, but not limited to, its overall state and the structure of the economy, the structure of GHG emissions, and its experience in any form of participation in the carbon markets. To a large extent, it is also influenced by the ability and willingness of the policymakers to consider carbon pricing as a method to achieve climate targets, and the ambitiousness of these targets. In this regard, as part of this research, such criteria as importance and effectiveness of the CPI for a country are also considered.

Analysis of the Central Asian countries and Azerbaijan demonstrates that a CPI could not be considered as a "one-size-fits-all" approach, universally applicable and efficient in all cases.

In Kyrgyzstan and Tajikistan, both lack of readiness and the necessity for introducing carbon pricing are identified. These countries still have other opportunities for green growth that could be sufficient to reach an NDC, given the current economic structure and national priorities. In the case of Turkmenistan, introduction of a CPI could be considered a beneficial but premature measure, since the country lacks the initial elements of climate regulation. Azerbaijan is more integrated into international trade, and demonstrates some efforts to join carbon markets. Using the momentum of a COP29 host country, Azerbaijan could consider fiscal carbon measures to raise the competitiveness of its exports and pave the way for further diversification of its carbon-intensive economy. Uzbekistan has the majority of prerequisites for efficient carbon pricing in place, and introducing a CPI could be considered as a reasonable next step on the country's low-carbon development path. Kazakhstan demonstrates a unique example of a country that already has CPI in the form of the ETS in place. The country's low-carbon ambitions, implied in the national strategic documents, prove that the application of carbon pricing is justified from the standpoint of importance, efficiency, and readiness; it is considered as the key element of carbon regulations, and the country will follow the path of further adjustment of CPI.

Azerbaijan

As stated in previous chapters, **Azerbaijan's economy is highly oriented to the export of natural resources.** The mining sector accounts for one third of the country's GDP and one third of value added. The structure of exports confirms the single-commodity orientation: 88% of exports are fuels and minerals as of 2024, while the country has to import science-intensive machinery. The issue of diversification of the economy through the non-oil sector is urgent and is clearly stated by the government.

up to 5%

potential reduction in Azerbaijan's real GDP by 2060 due to CBAM

The high carbon intensity of strategically important exports is becoming increasingly evident, making the economy vulnerable to transitional climate risks and current changes in the international arena. For example, 58.6% of all fertilizer exports, which constitute a significant part of the country's exports, are subject to the CBAM at the current stage, and when CBAM is extended to all items imported to the EU in the future, more than half of Azerbaijan's exports will fall under the regulation (in 2023, exports to the EU accounted for 64.38% of total exports). **CBAM is projected to result in Azerbaijan's real GDP falling by 1–5% by 2060, contingent upon varying scenarios** (World Bank, 2023).

The general structure of the economy demonstrates that energy itself is not a key driver of economic growth, although it ensures the country's internal resilience. Azerbaijan's exports of electricity generated from carbon-intensive sources is about 25–33% of all generated electricity, with Central Asian countries being the target

market. **Internal carbon pricing provides opportunities for Azerbaijan to protect its exports, other than to level market prices for carbon-intensive positions.**

As described previously in detail, Azerbaijan's energy market is highly carbon-intensive; fossil fuels constitute more than 80% of the energy supply. Azerbaijan, as all of the countries in the scope of this research, has committed to emissions reduction under the Paris Agreement; it also focuses on development of RES and introduction of low-carbon industrial technologies. A significant share of emissions is accounted for by gases other than CO_2 associated with extraction, on-site combustion, production, and transportation of fossil fuels. Methane accounts for 25.4% in Azerbaijan's emissions profile, while being poorly regulated by current policies. Considering that Azerbaijan announced its signing of the Global Methane Pledge at the COP29 in November 2024, the regulation is expected to be expanded. The transportation sector, accounting for almost 9% of all the GHG emissions in the country, is also insufficiently addressed by the climate policies. Concluding with the relation of the economy and the emissions structure, the energy sector as well as mining and quarrying lie in the scope of the potential carbon pricing mechanism.

Azerbaijan implemented six CDM projects in the energy and waste sectors, giving the country experience in climate projects.

Despite the moderate climate-related ambitions, reduction capacities are lacking. Reaching the economy-wide target of the NDC to reduce emissions by 40% compared to 1990 level by 2050 is only possible with financial support from abroad. The regulation gap remains evident when looking at the coverage of existing policies, which govern only energy and industry sectors, taking into account the diverse structure of emissions. The policies in force may be considered complementary to potential carbon pricing. When considering the capacity of the government to develop fiscal policy, the Azerbaijan government's effectiveness and regulatory quality are at the world average and higher then the regional average. In view of this, **the preparation and implementation of an additional fiscal instrument should not cause difficulties as long as Azerbaijan receives technical assistance and adopts international experience.**

Despite not having a framework for CPI or offsets in force at the moment, interest based on past experience is evident. **Previously Azerbaijan implemented six CDM projects in the energy and waste sectors, giving the country experience in climate projects**. At the company level, SOCAR — the State Oil Company of Azerbaijan — has been implementing offset projects in partnership with multinational corporations in the oil and gas sector. This experience could help make the transition to a more comprehensive regulation smoother.

The country's climate policy assertiveness at the moment is also boosted **by hosting the largest high-level climate event in the world, the UNFCCC Conference of the Parties (COP29).** At the present time, public declarations and regulatory

documentation indicate that a novel obligatory reporting framework on emissions at the company-level and carbon taxation are in the final phase of development. **Azerbaijan possesses all the prerequisites for fiscal carbon regulation:** the economic imperative linked to the intensification of regulation in export markets is well-founded, as well as the regulatory gaps unaddressed**.**

However, the ground needs to be prepared for introduction of any instrument: Azerbaijan does not have a functioning system of accounting and control of emissions, and fossil fuel subsidies are used. While the country is on the path to create its own climate monitoring and reporting system via support from international organizations, there is no evidence of intentions and readiness to completely eliminate fossil fuel subsidies. In the absence of quality data on emissions, **it is recommended to introduce a carbon tax, which is supervised in a more centralized way and can be monitored manually**, as opposed to setting quotas for companies and a decentralized emissions trading framework. To maximize the effectiveness of a carbon tax, it will take efforts to get on a path to eliminate fossil fuel subsidies.

Kazakhstan

Kazakhstan has the world's 16th-highest per capita and fourth-highest per GDP rate of emissions. The country's economic model relies on fossil fuels used in energy, industry, and exports to a large extent, with energy-related emissions contributing 77% of the country's total emissions. Kazakhstan's GDP growth is forecasted at about 5.5% in 2025–2026 (Vinokurov et al, 2024). **Among all the countries considered, Kazakhstan has the largest share of exports going to the EU (around 46% in 2024), with such products as aluminum and ferrous metals being highly exposed to future CBAM regulation**. The amount of the CBAM costs will be directly influenced by the country's efforts to reduce carbon intensity and achieve its NDC targets.

In its revised NDC, Kazakhstan has committed to reduce GHG emissions by 15% by the end of 2030 relative to 1990 base year or by 25% subject to international support. Moreover, Kazakhstan aims to achieve carbon neutrality by 2060, and has some supporting long-term targets e.g., reducing the energy intensity of GDP from the 2008 level by 50% by 2050, and increasing the share of alternative sources in electricity generation to 50% by 2050.

In its Carbon Neutrality Strategy till 2060, Kazakhstan considers carbon pricing as one of the suggested approaches that would foster low-carbon development.

Kazakhstan is the only country within the scope of this research that has a carbon pricing instrument in place, in the form of the national emission-trading system. The system currently covers about the half of the country's emissions, and includes only CO_2. In its Carbon Neutrality Strategy till 2060, **Kazakhstan considers carbon pricing as one of the suggested approaches that would foster low-carbon**

development. Alongside the development of the MRV system, the Strategy envisages the operation of both the ETS and the carbon tax, admitting that the ETS is the key element in the whole system of carbon regulation. The further strengthening of the ETS includes lowering the quota on emissions allowances and reconsideration of the carbon intensity benchmarks. Moreover, the country admits that decarbonization would require phasing out the non-efficient fuel subsidies.

These facts demonstrate that Kazakhstan's policymakers are well aware of both risks and opportunities that the current climate policy landscape brings, are considering the strengths and weaknesses of the current carbon regulation, and are committed to align them with the long-term ambitious targets on emissions reduction. The country has a set of climate policies and frameworks covering key emitting sectors, as well as **enough prerequisites for the further successful enhancement of carbon pricing instruments**, including the trajectory of the next steps, experience and lessons learned, authorities responsible for the ETS regulations and operations, as well as support and capacity-building from international organizations. Given the current carbon-intensive structure of the economy, it could be assumed that the effectiveness of the carbon pricing reforms would directly influence the ability to achieve carbon neutrality. Since the necessary improvements that would allow better alignment of carbon pricing approaches with the NDCs are already provided for, the CPI itself could be considered as an important and effective tool to address the country's climate-related challenges and opportunities, with the readiness indicators also ensured. Future success would be defined by the practical measures taken, the resistance of the business and community sectors directly or indirectly exposed to the reinforcing regulation, and the ability of the policymakers to ensure public support.

Kyrgyzstan

The economy of Kyrgyzstan is growing at an average rate of 9% year-to-year for the period 2022–2024 and is showing promising forecasts with a growth rate at around 4.1–5.35% (Vinokurov et al, 2024). The economy has not yet unlocked its full potential and intends to maintain this growth rate despite the changing external environment. The economic growth is fueled by, *inter alia,* active foreign trade: exports mainly consist of goods of natural origin such as agricultural and mining products, and most imports are accounted to science- and technology-intensive products such as equipment and machinery. Since sustainable economic growth directly depends on the exports of agricultural and mining products, these are the sectors that would be hardly covered by any climate-related restrictions in the near future. Since a low volume of trade flows is directed to the EU, the perspectives of CBAM do not threaten Kyrgyz exports. Therefore, **if a CPI is considered for implementation, its design should focus on sectors with a smaller share in the economy but a higher share in the emissions structure.**

Such a carbon-intensive sector, which has a smaller impact on economic growth, is the energy sector. Being responsible for >60% of emissions, the sector has a large RES potential for power generation, especially hydropower, giving Kyrgyzstan energy self-sufficiency. In 2021, the share of fossil fuels in the Kyrgyz energy balance was 56%, which is relatively small compared to other countries in the scope of this research, making the country capable of diversifying its energy supply and less dependent on fossil fuel subsidies to sustain the economy. **The energy sector is relatively independent from world trade and has the greatest potential for emission reduction due to renewable energy potential that is not yet unlocked.**

In terms of climate ambitions, the Kyrgyz approach is unique: **the target for achieving carbon neutrality by 2050 has been set and even the intention to create an image of a "negative emissions" country has been announced.** The policy focuses on greenery planting and using renewable energy sources for needs of households. Concerns are raised about the low effectiveness of public governance and low regulatory quality compared to other countries, while the sectoral coverage of current climate policies and their coherence with CPI is very low. Despite news on consideration of policies that overlap with carbon pricing instruments (in particular, a green tax), no real action has been taken yet. Taking this into account, CPI policymaking capability at the moment is doubtful.

In order to reach its climate-related targets, the country is seeking international support, which has also been envisaged in the NDC describing "business-as-usual", "with measures" and "with international support" scenarios. Although previously Kyrgyzstan was poorly engaged with international carbon trade mechanisms, with only two CDM projects implemented, many international institutions are now providing climate-related technical assistance and capacity-building for the country. These include assistance in building an MRV system, and could be then useful for developing CPI elements. For now, neither regulations for CPI nor the MRV system have been developed. Given that the focus on greenery planting and afforestation, offsets sales could take their place in the country's climate framework, although the Kyrgyz Republic is not yet experienced in implementation of climate projects. With regard to essential elements of both carbon tax and an emission trading scheme, **Kyrgyz Republic has made announcements in program documents to develop and implement an MRV framework**, although no public or non-public emissions registry has been launched.

To sum up, Kyrgyzstan lacks the prerequisites for fiscal carbon regulation: no actions towards policy implementation have been taken, potential agents of CPI (emitting companies, government authorities, and the general public) are not showing interest in a carbon market. When discussing design of any potential instrument, carbon tax would be preferable to an ETS in terms of national supervisory capacity, while the optimal scope of taxation lies only within the energy sector. Given that the country has gained limited experience in similar international instruments and is now receiving

technical aid to catch up with best practices, policy development would require close intervention from bodies with similar international experience. As the target to increase RES generation will further narrow the already limited scope of potential CPI, **a carbon tax would not make a significant difference in emission reduction, so it is not a requirement for the country to achieve its climate commitments.** The Kyrgyz Republic ought to first develop a monitoring and reporting system and improve the transparency and quality of its climate-related data disclosure, which is currently limited.

Tajikistan

Tajikistan has the lowest CO_2 emissions in the region. The largest share of GHG emissions is attributed to agriculture, which is at the same time is one of the largest contributors to the country's GDP. The energy sector is unique, with the major share of electricity generation provided from hydropower. Nevertheless, Tajikistan faces energy deficiency, and the strategic development plans of the country include the increase in energy capacities, including renewable energy sources. These initiatives would support rapid economic growth, as the GDP is forecasted to grow at a rate 7.8–8.2% in 2025–2026 (Vinokurov et al, 2024).

The country has both conditional and unconditional NDC targets for GHG emissions reduction. Considering the current and projected energy mix with the dominating role of renewables, **the targets seem to be achievable without implementing carbon pricing instruments** — this measure is currently not considered in the policy documents. The country is not heavily exposed to the transition climate risks related to global trade. The most CBAM-exposed produce in Tajik exports is aluminum, the carbon intensity of which could be reduced by using hydropower as an energy source. On the other hand, Tajikistan is very vulnerable to climate change impact, and is thus focusing more on adaptation than mitigation.

Energy tariffs are subsidized in Tajikistan to support household and some industrial energy consumers. **Nevertheless, the country acknowledges the need to gradually reduce the subsidies**, as they deter investments in energy efficiency and modernization of infrastructure including that of capital-intensive hydropower plants. Both elimination of energy subsidies and introduction of carbon pricing could become a heavy burden for the population, with nearly 50% of families living below the poverty line, according to UNECE.

Tajikistan already receives assistance in development of an MRV system, and it is expected that GHG reporting would become mandatory after 2030. The country also agreed on external financial support in achieving an NDC. Amid a lack of regulatory preparedness, comparatively low level of GHG emissions, future plans to increase the RES share in energy generation and exposure to physical climate risks, **the introduction of carbon pricing at the current stage can be considered not applicable in terms of importance, readiness, and effectiveness.**

Turkmenistan

Turkmenistan is the largest emitter of GHG in Central Asia, with a CO_2 intensity of GDP roughly 173% greater than the world average, and the 8th-most energy-intensive economy in the world, according to the UNECE (UNECE, 2024). The energy sector is responsible for more than 90% of the country GHG emissions, and fossil fuels and their products compose more than 80% of the country's exports. The CO_2 emissions from fossil fuel combustion demonstrate the stable uptrend from 37 Mt of CO_2 in 2000 to 85 Mt of CO_2 in 2022, according to the IEA (IEA, 2022). The country's GDP is described by the similar trend, growing from USD 2.9 billion in 2000 to USD 60.63 billion in 2023, according to the World Bank (World Bank, 2023).

The country's NDC could be considered ambitious, representing a 20% reduction in GHG emissions under the business-as-usual scenario relative to 2010 emissions levels. The country commits to neither conditional (subject to international support) nor net-zero targets, which could indicate that **Turkmenistan does not plan to raise its climate mitigation ambitions, prioritizing economic growth.** The carbon pricing instruments are not considered in the strategic or regulatory provisions as means for emissions reduction in the near future.

Significant attention in the country's NDC as well as in the National Strategy of Turkmenistan on Climate Change is paid to adaptation, proposing adaptation measures in the agriculture and water sectors, healthcare, soils and land resources, ecosystems and forestry, and hydrometeorological activities. As for mitigation, Turkmenistan is focusing on energy efficiency improvement and development of RES. Turkmenistan has only one hydropower plant, although the country's conditions are considered to be favorable to solar and wind energy development. The existing energy subsidies deter investments in renewable energy and energy efficiency, and could be considered as a barrier to carbon pricing.

The country lacks both internal and external drivers for carbon pricing. Its exposure to the EU's CBAM that could promote discussions on the need for this instrument is negligible. There is no evidence of any public or think-tank discussions on the matter; major capacity-building is dedicated to development and introduction of an MRV system, which is not yet in operation, making transparent data on GHG emissions unavailable. The country does not have any track record of using carbon trade or implementing offset projects, thus no opportunity to consider carbon emissions / reductions as a commodity is revealed. No specific plans for fossil fuel subsidies phase-out also push back the prospects of any carbon pricing. The country should first develop a trustworthy MRV system, strengthen its institutional capacity, develop roadmaps for energy efficiency and renewable energy, and consider gradual phase-out of energy subsidies. The further analysis of the sufficiency of these measures would then result in more justified discussions on the need for carbon pricing. Nevertheless, stronger regulatory measures and additional investments could be needed in the

particular case of methane emissions, due to the largest share of this gas in the GHG emissions structure and since the country has signed the Global Methane Pledge, and also due to the very frequent occurrence of methane emissions during the production and transportation of natural gas. At the same time, measures to prevent or fix methane leaks, such as improving pipeline maintenance or avoiding gas flaring, would be more efficient and preferable.

Uzbekistan

As mentioned in Chapter 2, the economy of Uzbekistan is highly dependent on natural resources: land, minerals, and fossil fuels contribute the largest shares of GDP and value added within the country. Agriculture, which is vulnerable to climate change, plays a truly important role in supplying the population, as well as in both imports and exports. The mining industry is not key to the economy, despite its high share in exports. **Given that CBAM exposure is not considered significant for Uzbekistan, fiscal carbon regulation would primarily target internal climate-related goals.**

The energy sector is not the main driver of Uzbekistan's economy, but it plays a very important role in ensuring a decent standard of living for the population. The carbon-intensive energy sector is a bottleneck in Uzbekistan's economy, as it is unable to ensure stability of supply and is therefore in search of sustainable energy sources and financial catalyzers within the country. On the one hand, its contribution to GDP is minimal, so that application of CPI would not significantly influence the existing economic structure, being a positive signal for CPI perspectives. On the other hand, the overall situation in the electricity market and the level of consumer prices depend on seasonal and other external factors, which can poorly be predicted. **This makes imposing a CPI on the energy sector a decision with unpredictable outcomes and requires taking into account the negative attitude of residents to an increase in electricity costs.**

The GHG emissions structure is average for the world: the primary sources are energy sector, mining, and transportation. As mentioned before, energy self-sufficiency is an important goal to ensure the continuity of electricity generation. The share of imports in electricity supply is low at 6.4%, but in fuel supply it is about 21.5%, being significantly supported by imports of natural gas. For now the RES share in Uzbekistan's energy mix is relatively small, even though the government counts on its RES potential, having aimed to increase RES generation to 18% by 2024 year-end and considering a development pathway with net-zero in electricity by 2050 (President of the Republic of Uzbekistan, 2024). This leads to the conclusion that if ambitions to increase RES generation are successful, the regulated emissions base in the energy sector would become relatively small and carbon taxation on energy would not lead to a significant effect in terms of GHG emissions reduction. Power installations and transportation are generally addressed by existing climate-related policies, but it is doubtful whether they are sufficient to reach net-zero in electricity

by 2050. Thus fiscal carbon regulation in the energy sector remains disputable, when mining and transport could be considered more suitable regulation targets. The facts that Uzbekistan has committed to the Global Methane Pledge and that mining is the largest source of methane emissions in the country also argue for including mining in the scope of prospective CPI.

The key to the effective development and implementation of rules and procedures, government effectiveness, is assessed by the World Bank as average for the region. The recent assessment demonstrates a positive trend for governance quality, especially in regulatory quality. However, given that Uzbekistan does not rely on international financial support in its NDC, climate policies are not very rigorous, being designed not to hinder economic growth. For example, fossil fuel subsidies support producers and maintain the low level of prices and energy tariffs, and there is no intent to reduce them. Existing policies are also complementary to a carbon pricing, should one be introduced.

Uzbekistan is an active participant in the international climate agenda, in particular in global carbon trade. **The country has implemented 15 Clean Development Mechanism projects and launched the first large-scale carbon crediting program of its kind in Central Asia** — the Innovative Carbon Resource Application for Energy Transition Project for Uzbekistan by the World Bank. The project aims to support energy subsidy reform and rational energy use in the country. The resulting verified emission reductions could then be sold in international carbon markets (IBRD, 2023). However, the appetite for participation in international carbon credits trading has not boosted either discussions about the ETS or the attention of the academic community to the topic. Rather, the country is more disposed to a carbon tax and is considering various options for its regulatory implementation over the 2030 horizon.

So far, few prerequisites for carbon pricing have been implemented, and fossil fuel subsidies are present in the economy. With the support of international institutions, the country is moving towards establishing its own monitoring, reporting, and verification (MRV) system — in November 2024 the Concept of the national transparency system in the transition to green economy was approved. **Since there is a public consensus on the importance of climate change, Uzbekistan should consider introducing a carbon tax covering the mining, transport, and, with particular care and an incremental approach, energy sectors.**

6. Conclusions and Policy Recommendations

Some challenges that Central Asian countries and Azerbaijan face when considering carbon pricing instruments are the same, and some differ. All emerging economies could face lack of buy-in from stakeholders, and concern that additional burdens could hamper sustainable economic growth. Although all countries in the scope of this research have set climate-related targets, the approach to their achievement depends on a variety of factors that should consider both country readiness to implement CPI as well as the prospective importance of CPI for a country climate agenda and future competitiveness linked with it.

Therefore, an integrated approach to decision-making that provides for a number of consecutive steps is suggested.

At **the preparatory stage**, a country should assess its current prerequisites, institutional capacities and barriers, and lay the foundation for a comprehensive climate policy. The recommendations are applicable to all countries in the scope of this research.

1) Conduct a readiness assessment. A list of key indicators or country-level readiness assessment tools could be prepared and validated by the country's officials before full-scale implementation (as suggested in Chapter 5). The tools will help to evaluate the level of development of carbon pricing policy, mechanisms and instruments, and technical readiness required in each country. Based on the readiness assessment toolkit, priority sectors and economic agents could be identified for gradual implementation of carbon pricing. The readiness assessment can also include an analysis of potential cost / benefits of introducing carbon pricing in country's socio-economic development.

2) Establish and strengthen institutional a monitoring, reporting, and verification (MRV) framework for carbon pricing. In all these countries a robust MRV system is recommended to track records of emissions and compliance with international agreements. At the beginning, an MRV framework needs to be established at least in countries (for example, **the Kyrgyz Republic** and **Turkmenistan**) which don't have one. An MRV framework could be strengthened where one has already been established (for example, **Kazakhstan**). To establish and strengthened an MRV system, one of the proposals could be establishment of an "MRV Division" to implement regulatory and infrastructural MRV insights.

If the results of preparatory work indicate the need and readiness of a country to implement carbon pricing instruments, **carbon pricing enablers** should be

considered and strengthened. These recommendations are particularly applicable to **Azerbaijan, Kazakhstan, and Uzbekistan**.

1) Set out targets and corresponding roadmaps to phase out fossil fuel subsidies as negative to carbon prices. Fossil fuel subsidies are not providing a level playing field for renewable energy proliferation, as they work as negative carbon prices which must be phased out. For example, reallocation of the subsidies in **Turkmenistan** and **Uzbekistan,** which heavily subsidize fossil fuels, toward renewable energy projects (solar and wind farms) could ensure affordability and accessibility in transition.

2) Tailor carbon pricing policies, mechanisms, and instruments to the prevailing economic structure, energy mixes, and institutional capacities of each country, and align them with complementary policies so that CPI follows wider long-term national climate and development strategies. Alignment and strengthening of carbon pricing policies with complementary policies (progressive FiTs, subsidy reforms, innovation and energy trade policies, etc.) are important to amplify market signals for carbon pricing. For example, **Kazakhstan** has a relatively established ETS; therefore, as a next step, Kazakhstan could consider incorporating sticker caps on emissions and progressively including more sectors that cause emissions, like transportation and agriculture, to enhance the impact while using the existing benefits. A hybrid system (a modest carbon tax with renewable energy incentives) could be proposed for **Azerbaijan** to balance industrial growth with environmental goals.

3) Consider regional cooperation and harmonization opportunities. The carbon pricing regulatory policies should be designed in a coordinated and flexible manner to reduce administrative and technical complexities. The regional carbon pricing policies and mechanisms not only address national sectoral projects, but also transboundary solar or wind farm projects, to amplify regional benefits and integration effect. For example, China's and **Kazakhstan's** cases for synergies and alignment could be considered, as both countries have ETSs in place.

4) Raise awareness and engage stakeholders. The public buy-in for the carbon pricing policies is extremely important, which requires relevant stakeholders' engagement. Programs could be designed in such a way as to encourage (highlight economic benefits) public outreach and refute myths surrounding carbon pricing policies. Multi-stakeholder (government officials, academicians, industries, and the private sector) and multi-sectoral (energy, mining, cement, construction, and agriculture) programs could be established to promote public buy-in, and to ensure alignment with public needs.

5) Provide institutional capacity-building for efficient carbon pricing. The capacity-building initiatives could provide basic training on carbon pricing, its mechanisms

and implementation, and would be especially useful for further administration of the CPI. Synergies could be derived from good cases from the region.

If carbon pricing is considered premature or unnecessary at the current stage of climate policy implementation, a country could use a wide range of **additional instruments to promote low-carbon growth**. The recommendations are particularly applicable to Kyrgyzstan, Tajikistan, and Turkmenistan.

1) Introduce or incentivize feed-in-tariffs (FiTs) for renewable energy. The FiTs' implications can ensure revenue certainty for renewable energy producers. For example, FiTs could be beneficial by attracting private sector investment in solar and wind power to generate 25% of electricity from renewable sources by 2030. **Kyrgyzstan** and **Tajikistan**, with large hydropower potential, could integrate small-scale FiTs for off-grid solar and wind energy projects by utilizing the prevailing hydroelectric infrastructure.

2) Use the current renewable energy advantages to generate measurable emission reductions and create tradable carbon credits. The companies could then purchase credits from these renewable projects to offset emissions. The carbon credits could be marketed either domestically or abroad, promoting international cooperation and establishing new trade relations.

3) Exploring opportunities for collaboration to attract funding and technologies. Regional funding opportunities and partnerships to support cross-border renewable energy projects and cutting-edge technologies would help to generate financial resources from MDBs, developmental partners, the Green Climate Fund (GCF), and other agencies to support low-carbon development. A pronounced market orientation, and diplomatic and technical skills would be required to attract international collaboration for funding and technology.

Annex

Readiness Assessment Tool consolidated table

Assessment criteria	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
1. What are the key sectors contributing to GDP? Which sectors are the main drivers of economic growth?	Sectors with the largest share in GDP (Azerbaijan Statistical Information Service, 2023): Mining and quarrying — 33.20% Trade, repair of transport means — 10.4% Transport and storage — 8.1% Construction — 6.2% Manufacturing — 5.18%	Sectors with the largest share in GDP (Bureau of National Statistics, Kazakhstan, 2024): Service production — 58.3% Production of goods — 35.3% Industry — 25.6% Wholesale and retail trade, car and motorcycle repair — 19% Mining and quarrying — 11.9%	Sectors with the largest share in GDP (National Statistical Committee of the Kyrgyz Republic, 2024): Net taxes on products — 14.5% Trade: repair of transport means — 17.6% Manufacturing — 12.6% Agriculture, forestry and fishing — 8.6% Construction — 8.3%	Sectors with the largest share in GDP (Agency on Statistics under the President of the Republic of Tajikistan, 2024): Industry — 16.2% Agriculture — 24.3% Construction — 7.9%	Sectors with the largest share in GDP (Economy.com, 2017): Services — 47.7% Industry — 44.9% Agriculture — 7.5%	Sectors with the largest share in GDP (IMF National Summary Data Page, 2024): Agriculture, forestry and fishing — 18.3% Manufacturing — 20.2% Wholesale and retail trade, repair of motor vehicles and motorcycles — 6.0% Construction — 6.7%
2. Which sectors are trade-exposed?	Share of exports (Azerbaijan Statistical Information Service, 2023): Mineral fuels, minerals oils and their products, bituminous substances — 91.5% Edible fruit and nuts, citrus fruit — 1.5%	Share of exports (Bureau of National Statistics, Kazakhstan, 2023): Crude oil and crude oil products — 53.8% Radioactive chemical elements and radioactive isotopes — 4.4%	Share of exports (National Statistical Committee of the Kyrgyz Republic, 2023): Manufacturing — 79.96% Mining and quarrying — 9.80%	Structure of exports (Tajikistan Trade Portal, 2021): Gold, silver, precious and semi-precious metals — 58% Minerals — 9.5% Aluminum — 9.1% Cotton fiber — 8% Electricity — 4.1%	Structure of exports (ADB, 2021): Natural gas — 56.9% Oil products — 11.7% Oil — 13.8% Cotton fiber — 3.1% Electric energy — 2.2%	Exports of Goods and Services, commodity-wise (Statistics Agency under the President of Uzbekistan, 2024): Gold — 27.8% Services — 26.7% Industrial products — 15.6%

	Plastic and articles thereof — 1.4% Share of imports (Azerbaijan Statistical Information Service, 2023): Vehicle other than railway or tramway — 12.4% Mineral fuels, minerals oils and their products, bituminous substances — 11.9% Nuclear reactors, boilers, machinery and mechanical appliances and parts thereof — 11.5% Electrical machinery and equipment; apparatus parts thereof — 9.3% Articles of iron and steel — 3.8%	Refined copper and raw copper alloys — 4.1% Copper ores and concentrates — 3.9% Ferroalloys — 3% Natural gas in gaseous state — 2.6% Share of imports (Bureau of National Statistics, Kazakhstan, 2023): Cars — 5% Telephone sets — 3% Bodies and cabins — 2.6% Medicinal products — 2.3% Parts and accessories of motor vehicles — 1.9%	Agriculture, forestry and fishing — 7.45% Water supply; sewerage, waste management — 2.72% Information and communication — 0.03% Share of imports (National Statistical Committee of the Kyrgyz Republic, 2023): Manufacturing — 95.20% Agriculture, forestry and fishing — 2.88% Mining and quarrying — 1.14% Electricity, gas, steam and air conditioning supply — 0.58% Information and communication — 0.10%	Structure of imports (2022): Food for consumption and processing — 18.4% Vehicles — 12.8% Petroleum products — 11.3% Technological equipment — 8.5%	Cotton fabric — 1.5% Other — 10.8% Structure of imports (Lloyds Bank, 2022): Machinery and equipment — 23.1% Nuclear reactors, boilers, machinery, and mechanical appliances — 15.3%, Vehicles — 7.9%, Articles of iron or steel — 5.6%, Plastics and articles thereof — 3.4%	Food Products — 8.1% Chemical Products and articles thereof — 6.3% Imports of Goods and Services (Statistics Agency under the President of Uzbekistan, 2024): Machines and Equipment — 39.4% Chemical Products and articles thereof — 14.3% Energy and Oil products — 11.2% Food Products — 10.8% Ferrous Metals — 5.9%
3. What is the current electricity generation mix?	Fossil fuels share in generation capacity is 80% (IEA, 2023) RES share in electricity generation is 20% (2023) Net energy exports are 73.6% of total energy production (IEA, 2021)	Total energy supply (IEA, 2022): Coal — 50.5% Oil — 22.4% Natural gas — 25.4% Hydropower — 1.1%	Fossil fuels share in generation capacity is 56% (IEA, 2021) RES share in total energy supply is 28% (IEA, 2021)	Total energy supply (IEA, 2022): Hydro — 42.4% Oil — 29.9% Coal — 23.6% Natural gas — 4.1%	Total energy supply (IEA, 2022): Natural gas — 86.5% Oil — 13.4%	Fossil fuels share in generation capacity is 99.2% (IEA, 2021) RES share in electricity generation is 7.0% — Hydro only (IEA, 2021).

Assessment criteria	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
	Share of imports in electricity consumption is 0.81% (IEA, 2021)	Net energy exports — 54.3% of total energy production (IEA, 2022) Electricity generation (IEA, 2022): Coal — 62.1% Natural gas — 24.9% Hydro — 8.1% Wind — 2.0% Oil — 1.2%	RES share in total electricity generation is 85.6% (IEA, 2021) Net energy imports of total energy production is 40.6% (IEA, 2021) Share of imports in electricity consumption is 8.8% (IEA, 2021)	Electricity generation (IEA, 2022): Hydro — 92.7% Coal — 5.9%	Electricity generation (IEA, 2022): Natural gas — 100% Net energy exports are 52.3% of total energy production (IEA, 2022)	RES share in energy balance — 16% (gazeta.uz, 2025) Net electricity imports in total electricity supply are 6.4% (IEA, 2021) Net fuel imports in total fuel supply are 21.5% (Statistics Agency of Uzbekistan, 2023)
4. What are the main GHG emitting sectors?	Key emitting activities, and their contribution to total GHG emissions (without removals, UNFCCC, 2016): • Energy Industries — Gaseous Fuels — 21.10% • Fugitive emissions from fuels — Oil (well drilling, start-up, operation, oil production and transport) — 13.25% • Other Sectors (fuel burned for energy purposes in the commercial and institutional, residential, agricultural/ forestry/ fisheries sectors) — Gaseous Fuels — 12.24%	Share in total GHG emissions (without removals, Bureau of National Statistics, Kazakhstan, 2021): Energy — 77%, Industrial processes and product use — 8%, Agriculture — 13%	Share in total GHG emissions (without removals, UNFCCC, 2018): Energy — 61.17% Agriculture livestock — 29.10%	Share of total GHG emissions (without removals, UNFCCC, 2016): Agriculture — 45% Energy — 42% Industrial processes and product use — 10% Waste — 3%	Share of total GHG emissions (Climate Watch, 2021): Energy — 92.09% Agriculture — 6.35% Industrial Processes — 0.79% Waste — 0.77%	Share in total GHG emissions (without removals, UNFCCC, 2021): Energy — 67.97% Agriculture — 16.07% Industry — 14.56% Waste — 4.56% The electricity and heat generation category accounts for 42.1% (2021) of total GHG emissions from fuel combustion

	• Road Transportation (other then railway and aviation) — 9.49% • Fugitive emissions from fuels — Natural Gas (production, processing, transportation and storage) — 8.45%					
5. What are major gases in emissions structure?	Share in total GHG emissions (without removals, UNFCCC, 2016): CO_2 — 57.1% CH_4 (methane) — 25.4%	Share in total GHG emissions (without removals, Bureau of National Statistics, Kazakhstan, 2021): CO_2 — 75% CH_4 — 18% N_2O — 6% HFC — 1%	Share in total GHG emissions (without removals, UNFCCC, 2018): Net CO_2 — 6.86% CH_4 — 52.94% N_2O — 37.40% HFCs — 2.80%	Share in total GHG emissions, UNFCCC, 2016): CO_2 — 49.3% CH_4 — 31.1% N_2O — 17%	Share in total GHG emissions (Climate Watch, 2021): CH_4 — 63.7% CO_2 — 32.8% N_2O — 3.3% F-gas — 0.2%	Share in total GHG emissions (without removals, UNFCCC, 2021) CO_2 — 67.1%; CH_4 — 25.4%; N_2O — 7.0%; HFC — 0.5%
6. What is the NDC target of the country?	To reduce greenhouse gas emissions by 40% compared to 1990 level by 2050 (conditional)	To reduce GHG emissions by 15% by the end of 2030 relative to 1990 base year (unconditional) To reduce GHG emissions by 25% by the end of 2030 relative to 1990 base year (conditional)	To reduce GHG emissions by 16.63% by 2025 and by 15.97% by 2030 compared to level under the business-as-usual scenario (unconditional) To reduce greenhouse gas emissions by 36.61% by 2025 and by 43.62% by 2030 compared to level under the business-as-usual scenario (conditional)	Not to exceed 60–70% of GHG emissions as of 1990 by 2030 (unconditional) Not to exceed 50–60% GHG emissions as of 1990 by 2030 (conditional)	To reduce greenhouse has emissions by 20% by 2030 compared to 2010 levels under a business-as-usual scenario (unconditional)	To reduce greenhouse gas emissions per unit of GDP by 35% compared to 2010 by 2030 (unconditional)

Assessment criteria	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
7. Does the country have a carbon neutrality (net-zero) target?	No	Yes, by 2060	Yes, by 2050 + forming an image of a country with "negative CO_2 emission" by 2040	No	No	No
8. Does the country have a conditional target subject to international financial support?	Yes, to reduce GHG emissions by 40% compared to 1990 level by 2050	Yes, to reduce GHG emissions by 25% by the end of 2030 relative to 1990 base year (conditional)	Yes, to reduce GHG emissions by 36.61% by 2025 and by 43.62% by 2030 compared to level under the business-as-usual scenario	Yes, not to exceed 50–60% GHG emissions as of 1990 by 2030	No	No
9. Does the country have a fossil fuel subsidy elimination target?	No	Yes	No	No	No	No
10. What is the aggregate relative CBAM exposure index of the country?	Most Exposed CBAM Product: Fertilizer Product exports to the EU (% of GDP): 0.1% EU Share in Exports of CBAM Products: 15.9% Overall Relative CBAM Exposure Index: 0.004174	Most Exposed CBAM Product: Aluminum Product exports to the EU (% of GDP): 0.2% EU Share in Exports of CBAM Products: 13.7% Overall Relative CBAM Exposure Index: 0.0158	Not assessed by the Relative CBAM Exposure Index as of September 2024. Share of exports to the EU is 1.35% of total exports	Most Exposed CBAM Product: Aluminum Product exports to the EU (% of GDP): 0.1% EU Share in Exports of CBAM Products: 17.7% Overall Relative CBAM Exposure Index: 0.002295	Not assessed by the Relative CBAM Exposure Index as of September 2024. Share of exports to EU is less than 1% of total exports	Not assessed by the Relative CBAM Exposure Index as of September 2024 Estimations: Low, as exports to EU are low-carbon intensive. Export from UZB to EU: chemicals, Base metals, Textiles, Pearls, precious metals, Food (Vegetable) products Import from EU

						to UZB: Machinery, Chemicals, Transport, Optical, Plastics
11. Does the climate policy focus on mitigation or adaptation measures?	Mitigation	Mitigation	Mitigation	Adaptation	Mitigation and adaptation	Mitigation
12. What are the Regulatory Quality and Government Effectiveness Indexes (including policy quality and regulatory sufficiency) of the country?	Worldwide Governance Indicators: Government Effectiveness: 2012 — 24.64 2017 — 48.67 2022 — 50.94 Regulatory Quality: 2012 — 33.18 2017 — 38.10 2022 — 48.11	Worldwide Governance Indicators: Government Effectiveness: 2012 — 37.44 2017 — 49.52 2022 — 58.49 Regulatory Quality: 2012 — 38.39 2017 — 60.95 2022 — 52.83	Worldwide Governance Indicators: Government Effectiveness: 2012 — 30.33 2017 — 22.38 2022 — 17.92 Regulatory Quality: 2012 — 40.76 2017 — 37.62 2022 — 28.77	Worldwide Governance Indicators: Government Effectiveness: 2012 — 19.43 2017 — 10.95 2022 — 23.58 Regulatory Quality: 2012 — 17.06 2017 — 11.90 2022 — 11.32	Worldwide Governance Indicators: Government Effectiveness: 2012 — 12.32 2017 — 14.29 2022 — 12.26 Regulatory Quality: 2012 — 1.42 2017 — 1.90 2022 — 1.89	Worldwide Governance Indicators: Government Effectiveness: 2012 — 19.91 2017 — 30.00 2022 — 38.21 Regulatory Quality: 2012 — 3.79 2017 — 8.57 2022 — 31.60
13. What is the scope of coverage of the existing policy: sectors & gases?	Sectors coverage: Energy (RES), Industry (energy-efficient technologies) Source: Climate Policy Database GHG coverage: carbon dioxide (CO_2), methane (CH_4), nitrogen oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs)	Sectors coverage: Energy (Electricity and heat, RES, energy efficiency), Buildings, Construction, Waste Source: Climate Policy Database	Sectors coverage: Energy (Electricity and heat, RES generation enhancement), Housing, Agriculture and Forestry Source: Climate Policy Database	Sectors coverage: Energy (Electricity and heat), Industry, Buildings Source: Climate Policy Database GHG coverage: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O)	Sectors coverage: Energy (RES, energy efficiency) Source: Climate Policy Database GHG coverage: carbon dioxide (CO_2), methane (CH_4), nitrogen oxide (N_2O), perfluorocarbons (PFCs)	Sectors coverage: Energy (electricity and heat generation), Industry (energy efficiency), Transport, Housing, Agriculture & Forestry Source: Climate Policy Database

Assessment criteria	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
		GHG coverage: (CO_2), methane (CH_4), nitrous oxide (N_2O)	GHG coverage: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and hydrofluorocarbons (HFC)			GHG coverage: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs)
14. Which characteristics relate to climate policy mix in relation to potential fiscal management?	Complementary	Complementary	Overlapping (introduction of "green" taxes is considered)	Overlapping (introduction of green taxation, environmental fees and green subsidies considered)	Countervailing	Complementary
15. In what sectors and for what gases are companies obliged to account for emissions according to national legislation?	No obligatory accounting for GHG emissions	Accounting for GHG emissions is obligatory for the sources of more than 20,000 tonnes of CO_2 emissions per year in regulated industries: electric power, oil & gas, metallurgical, mining, chemical, production of building materials. The accounting is obligatory for CO_2 only.	No obligatory accounting for GHG emissions	No obligatory accounting for GHG emissions	No obligatory accounting for GHG emissions	No obligatory accounting for GHG emissions

16. In which Kyoto Protocol / Paris Agreement / other mechanisms does the country participate?	Clean development mechanism (CDM) (6 Projects in the Energy and Waste sectors, UNFCCC, 2016)	Domestic Emission Trading System, signed MoU with South Korea on cooperation in accordance with Article 6 of the Paris Agreement, signed Memorandum of Cooperation with Japan establishing the Joint Crediting Mechanism (JCM)	Clean Development mechanism (2 projects)	No evidence	No evidence	Clean development mechanism (CDM) (15 projects, UN) Article 6 of PA (iCRAFT project by World Bank, 2023)
17. Was a framework for offsets established in the country?	No SOCAR — State Oil Company of Azerbaijan — voluntarily participates in intentional carbon pricing projects: Upstream Emission Reduction (UER) project, company-level trade in certified carbon offset crude cargo (CPC Corporation, 2022)	Yes, the Environmental Code has provisions related to carbon offsets; the first voluntary carbon standard developed in 2023	No	No	No	No
18. Are institutions (e.g., environmental regulators) in place that could administer a CPI?	Ministry of Ecology and Natural Resources & Ministry of Economy are developing framework for carbon tax implementation (Azernews, 2025)	Ministry of Ecology and Natural Resources: responsible for establishing the ETS regulatory framework. JSC Zhasyl Damu: implementing authority, responsible for the registry and reserve management	Coordination Commission on Climate Change (coordination with the UNFCCC, between departments)	Committee on Environmental Protection	Ministry of Agriculture and Environmental Protection	Ministry of Ecology, Environmental Protection and Climate Change

Assessment criteria	Azerbaijan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
19. Is regulation on a CPI in effect?	No	Yes — Kazakhstan ETS	No	No	No	No
20. Was a public entity-level GHG emissions registry established?	No (under development, ИА Report, 2024)	No, but the amount of allowances per entity that participates in the ETS is available; the amount of GHG emissions per regulated sector is available	No	No	No	No (by 1 December 2024 the online platform of the National Transparency System was to be launched and integrated with the Green Economy online platform, President of the Republic of Uzbekistan, 2024)
21. What is the general public's support for policies and regulation for CPI?	High	High	Low	Low	The topic is not widely discussed	Low because of unattractiveness of additional financial burden
22. Have international organizations and academic community provided assessment or assistance (technical, analytical, etc.) to the country in regard to CPI / carbon regulation / fiscal climate policy?	GEF, UNEP — capacity-building, GEF, UNDP — technical assistance for GHG reporting EBRD-EIB Multilateral Carbon Credit Fund — project with carbon credits supply for MCCF participants ADB — capacity-building, technical assistance on policy design	GEF, UNDP — assistance in preparation of the 8th National Communication and the 5th Biennial Report of the Republic of Kazakhstan to the UNFCCC, World Bank Group — "Kazakhstan Partnership for Market Implementation"	UNDP & UNEP & OECD — MRV Guidelines (2013) GEF & UNDP — MRV and National GHG emissions inventory capacity-building project UNDP — Assessment of potential carbon market and offset framework	UNDP — Mitigation Pathways for Tajikistan to Achieve Carbon Neutrality by 2050, FAO — capacity-building on monitoring and evaluation, Initiative for Climate Action Transparency — capacity-building on MRV systems,	UNDP — capacity-building for GHG inventory, GIZ — EU for Green Development in Turkmenistan: Policy Dialogue and Climate Action 2024–2028, OSCE — capacity-building for methane emissions regulation	EBRD — Roadmap for a Carbon Neutral Electricity Generation Sector by 2050 UNDP — CDM capacity-building, UNDP/FCDO — research for MRV development UNDP — Assessment of the fossil fuel subsidy reform impact in Uzbekistan

	Project strengthening the effectiveness of the ETS, UNDP — national consultations on Paris Agreement Article 6.2 Framework, EBRD — capacity-building on preparedness for emissions trading, Initiative for Climate Action Transparency — capacity-building on MRV systems	UNDP — Clean Development Mechanism capacity-building	GCF, GEF — climate resilience and adaptation, ADB — Climate Finance Plan	UNDP, GCF — data collection enhancement GEF & FAO — capacity-building for transparency, World Bank — carbon crediting project iCRAFT Other organizations: GGGI, GCF

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Abbreviations

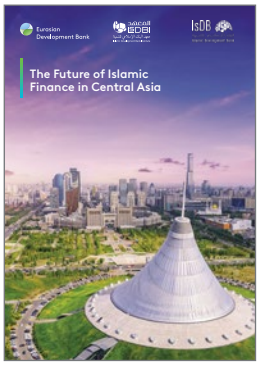
ADB	Asian Development Bank
BAU	Business-as-usual
CA	Central Asia
CBAM	Carbon Border Adjustment Mechanism
CDM	Clean Development Mechanism
COP	Conference of the Parties (United Nations Climate Change Conference)
CPI	Carbon pricing instrument
EAEU	Eurasian Economic Union
EBRD	European Bank for Reconstruction and Development
ESCAP	Economic and Social Commission for Asia and the Pacific
ETS	Emissions Trading System
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GHG	Greenhouse gas
HPP	Hydropower plant
ICAT	Initiative for Climate Action Transparency
IEA	International Energy Agency
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution
KSE	Kyrgyz Stock Exchange
MRV	Monitoring, reporting and verification
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
RES	Renewable energy source
SDGs	Sustainable Development Goals
SOCAR	State Oil Company of Azerbaijan
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America

Research at the EDB website

Macroeconomic Outlook
(RU/EN)

Macroeconomic Outlook 2025–2027

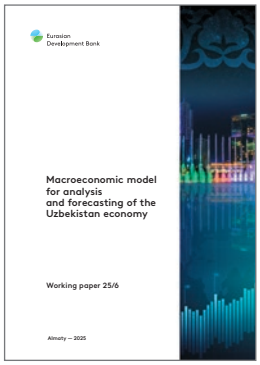
The Eurasian Development Bank (EDB) has published its Macroeconomic Outlook, summarising a preliminary overview of economic developments in the Bank's member states in 2024, along with key macroeconomic projections for countries in the region for 2025, as well as for 2026 and 2027.



Report
(RU/EN)

The Future of Islamic Finance in Central Asia

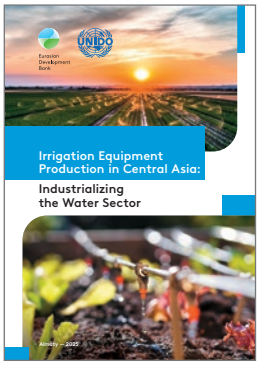
Joint report of the Eurasian Development Bank (EDB), the Islamic Development Bank Institute (IsDBI) and the London Stock Exchange Group (LSEG).



Report 25/6
(RU/EN)

Macroeconomic model for analysis and forecasting of the Uzbekistan economy

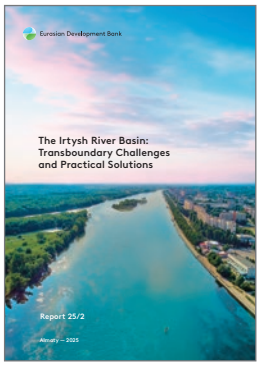
The working paper presents the developed model of macroeconomic analysis and forecasting of the Uzbekistan economy. The integration of the new model into the EDB's model complex makes it possible to more accurately and comprehensively forecast the economic development of the Bank's region of operations, while taking into account close cross-country relationships.



Report
(RU/EN)

Irrigation Equipment Production in Central Asia: Industrializing the Water Sector

Irrigation equipment production in Central Asia is becoming a strategic area for ensuring food security and efficient water resource management. A new report by EDB and UNIDO provides a detailed analysis of the current state of the market, a forecast of its development and recommendations for creating conditions for local production.



Report 25/2
(RU/EN)

The Irtysh River Basin: Transboundary Challenges and Practical Solutions

A recent study by the Eurasian Development Bank, titled "The Irtysh River Basin: Transboundary Challenges and Practical Solutions", presents the findings of a diagnostic analysis and a forecasting model of the basin's water resources. The study identifies the positions of the three countries involved and puts forward a series of practical solutions, including investment recommendations.

Report 25/1
(RU/EN)

Mutual Investments on the Eurasian Continent: New and Traditional Partners

The report contains detailed information on the scale, dynamics, geographical and sectoral structure of mutual direct investment stock between the countries of the Eurasian region, on the one hand, and China, Türkiye, Iran, and the Gulf states, on the other hand, for the period from 2016 to the first half of 2024.

Report 24/10
(RU/EN)

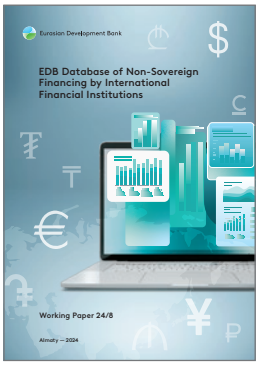
EDB Monitoring of Mutual Investments — 2024. Eurasian Region

The report contains detailed information on the scale, dynamics, geographical and sectoral structure of mutual direct investments of the Eurasian region from 2016 to 1H of 2024.

Report 24/9
(RU)

Non-sovereign financing of international financial organizations in the Kyrgyz Republic

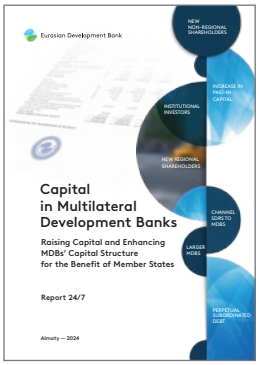
The report contains a comprehensive analysis of non-sovereign financing operations by international financial institutions in the Kyrgyz Republic over the last decade.



Report 24/8
(RU/EN)

EDB Database of Non-Sovereign Financing by International Financial Institutions

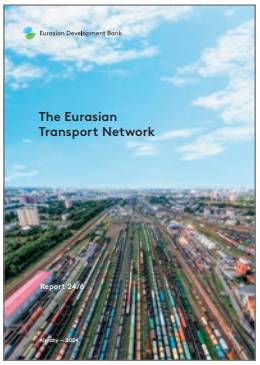
Non-Sovereign Financing (NSF) Database is EDB's new analytical project. The EDB Database is a dynamic tool for timely monitoring and analysis of non-sovereign operations of IFIs in the Eurasian region.



Report 24/7
(RU/EN)

Capital in Multilateral Development Banks

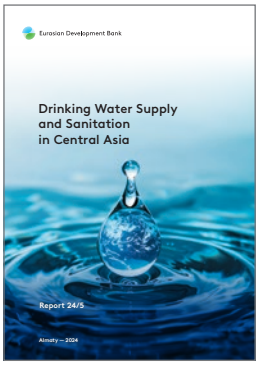
This paper covers the whole 'MDB family' of institutions but highlights regional and sub-regional MDBs because of their specifics of raising shareholders' capital. The study discusses seven standard and novel options for increasing capital.



Report 24/6
(RU/EN)

The Eurasian Transport Network

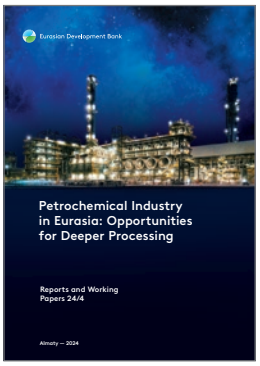
The report examines ten system elements of the Eurasian transport framework concept. Among them are the formation of a transport crossroads in Central Asia, priorities for intraregional transport connectivity, an impetus for realizing the agro-industrial potential of the countries of the region, and improvement of soft infrastructure.



Report 24/5
(RU/EN)

Drinking Wateer Supply and Sanitation in Central Asia

In Central Asia, 10 million people do not have access to safe drinking water. Given the priority importance of drinking water for public health and the scale of the challenges, a comprehensive approach is required in the region. A new EDB report presents a set of practical steps that shape such an approach.



Report 24/4
(RU/EN)

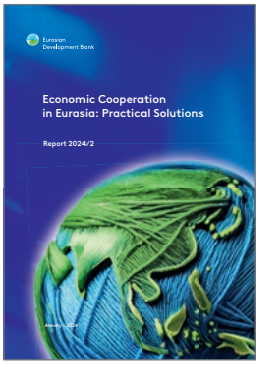
Petrochemical industry in Eurasia: Opportunities for Deeper Processing

The analytical report uses a balance approach to assess the production and export potential of the petrochemical complex of the Eurasian region (Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan) in the perspective up to 2035.

Report 24/3
(RU/EN)

Infrastructure in Eurasia: short-term and medium-term trends

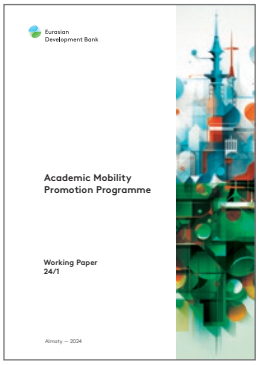
The EDB's report highlights ten important short- and medium-term investment and institutional trends in the region's energy, transportation, logistics, water supply and telecommunications sectors.



Report 24/2
(RU/EN)

Economic Cooperation in Eurasia: Practical Solutions

The EDB's report "Economic Cooperation in Eurasia: Practical Solutions" contains a "menu" of pragmatic applied solutions that can be enabled relatively fast and with flexible configurations among participating countries aimed at fostering mutually beneficial economic cooperation among Eurasian countries.

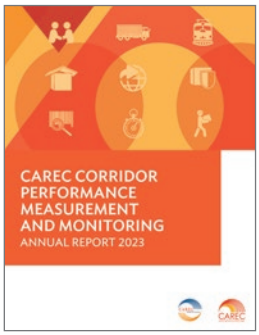


Report 24/1
(RU/EN)

Academic Mobility Promotion Programme

The EDB's working paper "Academic Mobility Promotion Programme" contains a comprehensive analysis of problems and specific practical solutions to ensure the sustainable growth of interuniversity relations and educational exchanges across the Eurasian region (the EAEU and CIS countries).

Publication at the CI website



Report
(EN)

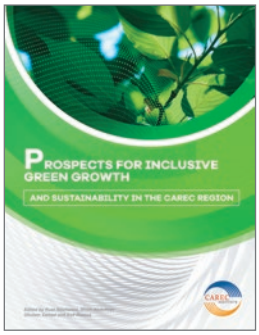
CAREC Corridor Performance Measurement and Monitoring (CPMM) Annual Report 2023

The CPMM Annual Report provides detailed overview of five Trade Facilitation Indicators (TFIs) across CAREC Border crossing points.

Quarterly Economic Monitor
(EN/CN/RU)

CAREC Institute Quarterly Economic Monitor (1-17)

It analyzes the macroeconomic direction of each CAREC country using key indicators.



Research Conference Report
(EN)

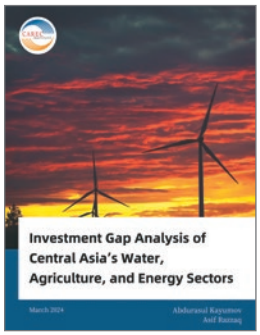
PROSPECTS FOR INCLUSIVE GREEN GROWTH AND SUSTAINABILITY IN THE CAREC REGION (3rd annual book)

The CAREC Institute's Third Annual Book is an output of the papers presented at the 3rd conference, covering many dimensions of green growth and sustainability.

Report
(EN)

Digital and Sustainable Trade Facilitation in the Central Asia Regional Economic Cooperation (CAREC) Based on the 2023 United Nations Global Survey on Digital and Sustainable Trade Facilitation

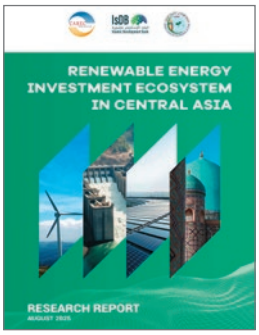
This comprehensive report underscores critical role digital solutions enhancing trade facilitation promoting.



Report
(EN)

Investment Gap Analysis of Central Asia's Water, Agriculture, and Energy Sectors

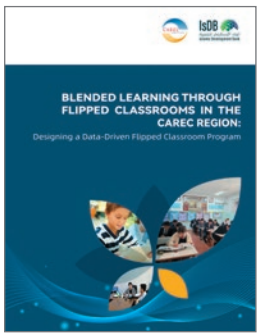
This report analyzes the investment gaps in Water, Agriculture, and Energy Sectors in the region.



Report
will be published soon...

Renewable energy investment ecosystem in central asia

This report analyzes renewable energy investment ecosystem in Central Asia and proposed an investment promotion program for Uzbekistan.



Report
(EN)

Blended Learning through Flipped Classrooms in the CAREC Region: Designing a Data-Driven Flipped Classroom Program.

This report presents a blended learning framework aimed improving educational outcomes through edu-tech.

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Your comments and suggestions concerning this document are welcome at km@carecinstute.org and pressa@eabr.org

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