

Central Asian Climate Policy Pledges Under the Paris Agreement: Can They Be Fulfilled?



Rahat Sabyrbekov , Indra Overland , and Roman Vakulchuk 

Abstract The Central Asian region has been and will continue to be significantly impacted by climate change and all the region's countries have pledged nationally determined contributions (NDCs) under the Paris agreement. This chapter aims to assess how likely Central Asian countries are to fulfil these pledges. To answer this question, we compare the NDCs to their respective national development programmes and historical trends. The results show that the countries of Central Asia vary in their ability to fulfil their pledges and that doing so will require structural changes to their energy systems, substantial investments in infrastructure and, most importantly, the alignment of their development plans with their declared climate goals. None of the countries have thus far engaged in structural reforms aimed at large-scale climate change adaptation and mitigation.

Keywords Central Asia · Climate policy · Development · Energy · Energy transition · Green economy

1 Introduction

The impact of climate change in Central Asia will be devastating. The existing research predicts increased risk of droughts and other natural hazards, rising prevalence of airborne diseases, the disappearance of many glaciers and the occurrence of unprecedented heatwaves (IPCC 2022). The research further indicates that the most vulnerable sectors of the economy are energy, agriculture, infrastructure and

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healthcare (Reyer et al. 2017). The countries of the Central Asian region do not have the resources needed to combat the negative consequences of climate change (Vakulchuk et al. 2022). Therefore, the region urgently needs to adopt sound national policies to adapt to and mitigate the risks.

Under the Paris Climate Agreement, the Central Asian governments have submitted nationally determined contributions (NDCs) and developed national adaptation plans (NAPs). It remains to be seen how realistic these goals and policies are in terms of their implementation. The countries have also announced climate strategies, both as part of their international climate commitments and within their national development plans. Inclusion of the impacts of climate change and strategies to mitigate or adapt to these in the national development plans of Central Asian countries is particularly important because of the region's climate vulnerability.

Despite this, we found no literature assessing the stated NDCs of the Central Asian countries and their alignment with national development strategies. This leaves key questions unanswered with regard to the content of the pledges, whether the countries are able to fulfil them based on current and historical data, and how well the stated national development goals align with each country's climate goals.

This chapter examines whether four Central Asian countries—Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan—can achieve their climate policy goals and whether their national plans match these goals. The fifth Central Asian country, Turkmenistan, is excluded from the study as no historical data or information on their strategy is available. To answer the questions posed above, we briefly review the historical trends in the national energy sectors and emissions. We then compare each country's NDC with its current national development strategy. The NDCs were accessed from the UNFCCC NDC registry in March 2022. The latest national development programmes were retrieved from the official websites of the governments of each country at the same time.

2 Historical Trends

2.1 *Energy: Growing Reliance on Fossil Fuels*

Central Asia is rich in fossil fuels and their importance for the economies of the region is hard to overestimate (Vakulchuk et al. 2022). The energy supply sector has a heavy historical legacy and has not changed much in the last fifty years. Thus, the energy infrastructure is quickly becoming outdated and lacks investment. The hydropower plants in Kyrgyzstan and Tajikistan, for example, are crumbling and require significant updating (Bekchanov et al. 2015; World Bank 2017). Historically, Kazakhstan and Uzbekistan have relied on oil and gas, while Kyrgyzstan and Tajikistan have been dependent on hydropower in addition to fossil fuels.

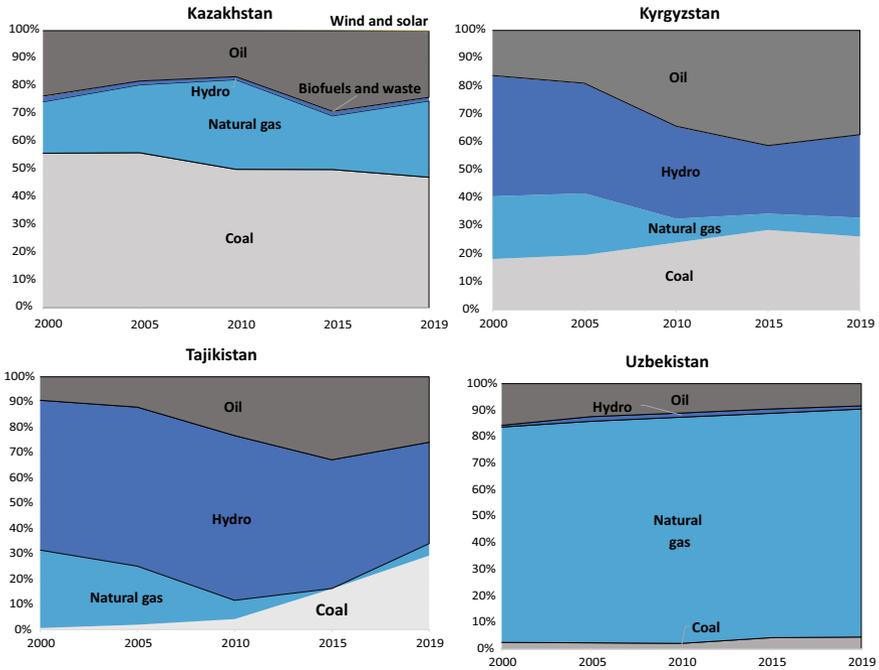


Fig. 1 Total primary energy supply by source (in per cent). *Source* IEA (2022)

The composition of the energy supply of the countries from 2000 to 2020 remained stable, with fossil fuel use making up the largest share (see Fig. 1). The energy mix in the total energy supply of Kazakhstan has not changed significantly, with hydrocarbons providing about 70% of all energy and only a small fraction coming from renewable energy in recent years.

In the cases of Kyrgyzstan and Tajikistan, we can observe the growing importance of coal and oil against the backdrop of a declining share of hydropower. This is due to the inability of the existing hydro plants to meet the growing energy demand from the residential and industrial sectors. From 2010 onwards, the Tajik government increased its reliance on coal for both electricity and heat. A similar pattern is found in Kyrgyzstan where it is coal and oil consumption that have grown (Vakulchuk et al. 2022).

Outdated energy infrastructure increases the vulnerability of the Central Asian countries to climate change. Most of the current energy infrastructure in Central Asia was built in the 1970s and has seen a little modernization since (Laldjebaev et al. 2018; Sabyrbekov and Ukujeva 2019). The cost of modernization is estimated to be significant, and the region has not managed to attract the foreign direct investment needed to upgrade the infrastructure (Vakulchuk 2022).

2.2 Emissions: Small Global Carbon Footprint but High Energy Intensity

The contribution of Central Asia to global GHG emissions is small, not even reaching 1% of global emissions in 2018. Moreover, the countries have not yet returned to the level of emissions during the Soviet period. The largest contributor to the total emissions in all four countries is the energy sector.

Kazakhstan has produced the highest total emissions at 220 MT of CO₂, followed by Uzbekistan, Kyrgyzstan and Tajikistan (see Fig. 2). Kazakhstan's emissions have grown steeply since 2001 due to expanding oil production, but the 2020 level still remains below the level from 1990 (Fig. 3).

As for per capita emissions, Kazakhstan also produces the highest amount in the region. Since 2009, its emissions have stabilized at 12–15 tonnes per capita. The amount had dropped rapidly in 2013 and then stagnated. Uzbekistan finds itself in second place, with its per capita emissions falling from 6 tonnes in 1990 to 4 tonnes in 2018. Interestingly, the rate of decrease in emissions per capita in Uzbekistan was faster than the rate of the country's total emissions, suggesting a gain in efficiency. The per capita emissions of Kyrgyzstan and Tajikistan are the lowest, but they have been growing steadily, mainly driven by increasing use of coal.

Compared to the world's average energy intensity of 6 MJ per unit of GDP, the economies of Central Asia are highly energy intensive (see Fig. 4). The highest level of energy intensity is observed in Uzbekistan, whereas Tajikistan has the lowest level. The energy intensity of the Tajik economy has been decreasing steadily and, since 2009, has been below the world average. In Kazakhstan, the level fell in 2001 and has remained stable since then. Though it has the highest level, Uzbekistan has also substantially reduced the energy intensity of its economy since 2003. From 2001

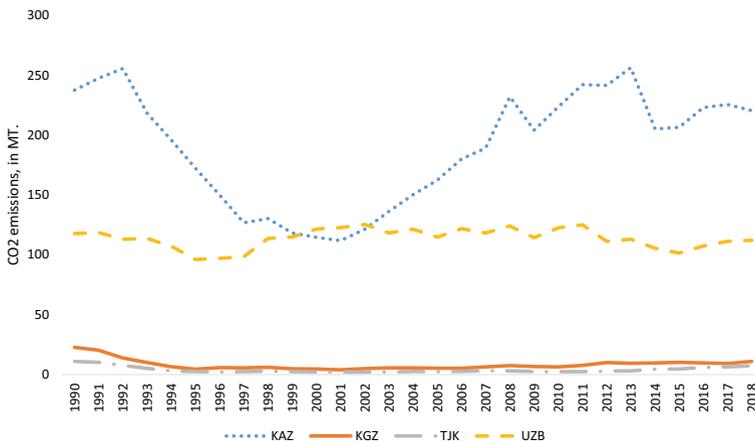


Fig. 2 Total CO₂ emissions by country (in MT). *Source* World Bank (2022)

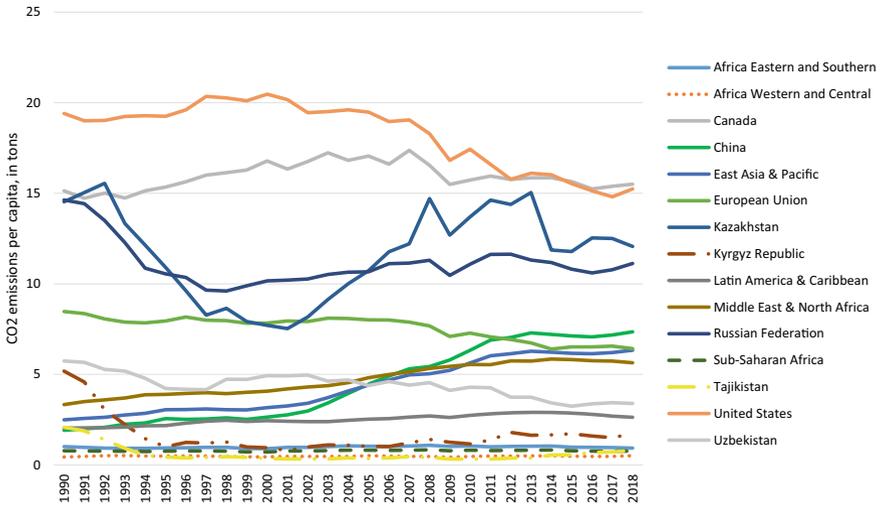


Fig. 3 CO₂ emissions per capita of Central Asian countries and selected world regions and countries

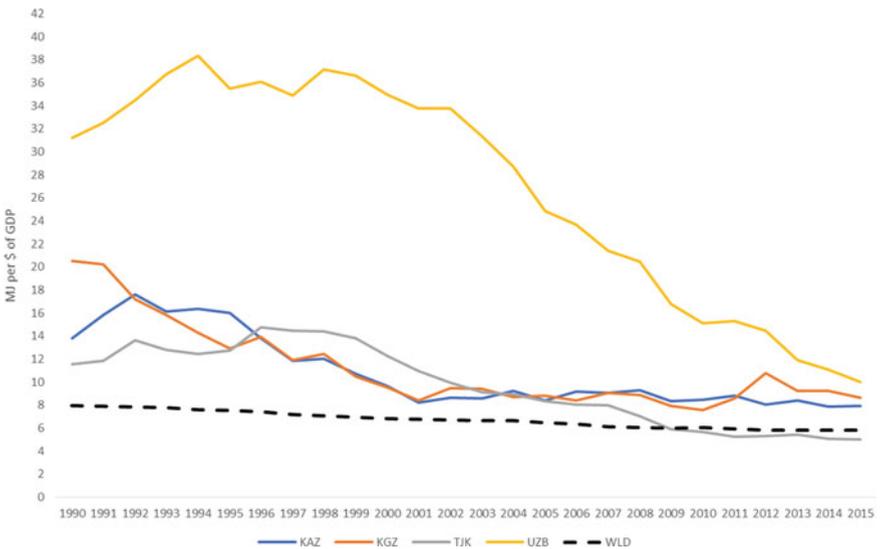


Fig. 4 Energy intensity (MJ/\$ 2011 PPP GDP). *Source* World Bank (2022)

onwards, Kyrgyzstan’s energy intensity grew fast, becoming second highest in the region in 2015. The high energy intensity of the Central Asian economies is partially explained by outdated infrastructure, lack of energy efficiency regulations and limited investment.

3 Nationally Determined Contributions

The four countries covered in this chapter are signatories to the Paris Climate Agreement and have submitted national development contributions (NDCs) that envisage the taking of various steps to reduce GHG emissions. The level of detail and overall approach of each country varies substantially.

3.1 *Kazakhstan*

Kazakhstan is the only country in the region which has not updated its initial NDC, submitted in 2016, as of 19 March 2022. The NDC is short and contains only a few details regarding the country's proposed climate commitments (Government of Kazakhstan 2016). The document sets the target of a reduction in GHG emissions by 15% by 2030 based on Kazakhstan's own resources, and 25% if international support is provided. The base year is 1990.

The country aims to reduce emissions in all sectors of its economy. The priority sectors are energy, agriculture, waste, land use and forestry. The NDC emphasizes increased energy efficiency and deployment of renewable energy. It also envisages improvements in waste management, modernization of housing and promotion of sustainable transport.

Despite the non-updated NDC, Kazakhstan is the regional climate policy leader. The country was the first and only state in Central Asia thus far to establish a national Emissions Trading Scheme, which it did in 2013 (Abdi et al., this volume). Kazakhstan was also the first in the region to attract sizable financial support from international banks for its renewable energy projects. In 2020, the share of renewables in the total energy supply of Kazakhstan reached a measly 3% (Vakulchuk et al. 2022).

In 2020, Kazakhstan's President Tokayev declared that the country would achieve carbon neutrality by 2060. Despite this ambitious declaration, many doubt that the high dependence on fossil fuels can be overcome so soon (e.g. Poberezhskaya and Bychkova 2021). Internal resistance and external geopolitical challenges may greatly complicate the ongoing decarbonization of the country (Koch and Tynkkynen 2021).

3.2 *Kyrgyzstan*

In 2021, Kyrgyzstan submitted an updated NDC which aims to reduce GHG emissions by 44% by 2030 with international support and by 16% without international support (Government of Kyrgyzstan 2021b). A business-as-usual scenario was used as baseline.

According to its NDC, Kyrgyzstan seeks to implement reforms in the energy, agriculture, forestry and land use sectors. In the energy sector, the country aims

to increase the share of renewable energy, improve energy efficiency, improve the natural gas supply network and increase the number of electric vehicles.

In the agricultural sector, the main activities include improvements in livestock productivity, increased organic crop production, increased efficiency of manure use and the generation of biogas. In forestry and land use, the measures include an increase in forest coverage and expansion of perennial plantations. These measures should contribute to both climate change adaptation and mitigation.

In Kyrgyzstan, 93% of all GHG reductions are to be achieved in the energy sector. The reductions are mainly (37%) to be achieved through a shift from the burning of coal to natural gas for heating, to be facilitated by the gasification of households (Table 1).

Table 1 Planned activities to reduce GHG emissions in the Kyrgyz energy sector under the most optimistic scenario (% of total reduction)

Activity	Measure	Share in total GHG emission reduction (%)
GHG reduction	Gasification of households	16
	Electric private vehicles	12
	Improved traffic management and cycling infrastructure	7
	Reduction in electricity loss in transmission and distribution	1
	Gasification of public transport	0.4
	Heat supply modernization	0.1
	Public transport electrification	>0.01
Energy efficiency improvement	Energy efficient stoves for households	20
	Replacement of coal-fired boilers with gas	15
	Energy efficiency improvements to buildings	0.5
Renewable energy deployment	Biogas expansion	22
	Construction of new small hydro plants	2
	Geothermal energy	2
	Expansion of solar heat collectors	1
	Solar power development	0.6
	Wind energy development	0.2
	Modernization of existing heat power plants	>0.1
	Small private hydro	>0.1

Source Authors' calculations based on the NDC of Kyrgyzstan

The Kyrgyz NDC includes an adaptation section with measures to address the most vulnerable sectors such as water resources, agriculture, energy infrastructure, public health, and forestry and biodiversity. It also features new intersectoral sections on Climate-Resilient Areas and Green Cities.

The Kyrgyz NDC may look ambitious in terms of overall reduction of GHG emissions, but the actual implementation relies heavily on the expansion of the gas supply network, i.e. an increase in fossil fuel use. Other significant reductions depend on external financial and technical support, for example for biogas expansion and the modernization of household heating. The role of renewable energy is small and the reduction of GHG emissions due to wind and solar power is expected to contribute to only about 1% of the total GHG reduction in the energy sector. Moreover, the government currently has no plans for a large-scale transition to clean energy.

3.3 Tajikistan

Tajikistan submitted an updated version of its NDC in 2021 (Government of Tajikistan 2021). The target for GHG emissions is to not exceed 60–70% of the level of 1990 emissions. With international support, the goal is to not exceed 50–60% of this level.

The priority sectors include agriculture, energy, forestry and biodiversity, industry and construction, transport and infrastructure. However, Tajikistan has neither provided sector-specific GHG emission targets, nor stated the concrete actions it will take. The measures are broad and mention the promotion of renewable energy, increased resilience on the existing energy and transport infrastructure, improvement of energy efficiency and promotion of non-motorized transport.

Ultimately, the NDC focuses strongly on adaptation and increasing resilience to climate change impacts. Specifically, the document emphasizes the strategic importance of the modernization of the existing energy infrastructure such as hydropower plants.

3.4 Uzbekistan

The updated NDC of Uzbekistan aims to reduce GHG emissions per unit of GDP by 35% compared to the level of 2010 by 2030 (Government of Uzbekistan 2021). The NDC contains a set of well-defined and measurable targets:

- double the energy efficiency indicator and reduce the carbon intensity of the GDP.
- bring the share of renewable energy to 25% of total power generation.
- upgrade the infrastructure of industrial enterprises and ensure their sustainability by increasing energy efficiency by at least 20%.

- expand the production and use of motor fuels and vehicles with improved energy efficiency and environmental performance, as well as develop electric transport.
- significantly increase water use efficiency in all sectors of the economy, introduce drip irrigation technologies on up to 1 million hectares of land and increase crop yields cultivated on this land by up to 20–40%.
- achieve Land Degradation Neutrality.
- increase the average productivity of basic agricultural products by 20–25%.

Uzbekistan also mentions in its NDC that it is considering the introduction of a carbon tax mechanism. Compared to its neighbours, Uzbekistan places more emphasis on economic development in its plans for improving energy efficiency and investing in renewable energy production.

3.5 Summary of NDCs

There is considerable diversity in the GHG targets of Central Asian countries. For example, the countries vary in their choice of base year (see Table 2). Kazakhstan and Tajikistan still use 1990 as a baseline, while Kyrgyzstan uses a business-as-usual scenario and Uzbekistan uses 2010 as a base year. The use of 1990 makes reaching GHG emission targets relatively easy since, during the Soviet period, Central Asia was part of a large industrial system with high emission industries.

The foci of the NDCs are also different. For example, Kyrgyzstan is focused on GHG emission reduction and provides detailed estimates of the decrease of emissions for each sector. Strikingly, Kyrgyzstan mostly intends to reduce its emissions through the expansion of the gas supply network. Tajikistan is more focused on adaptation and increasing resilience. Uzbekistan is focused on increasing the carbon efficiency of its economy and ensuring that climate goals do not create impediments to national development programmes. Interestingly, Uzbekistan's NDC explicitly states that the country does not aim to reduce absolute GHG emissions in terms of quantity but instead aims to reduce the carbon intensity of its GDP.

4 National Development Programmes

4.1 Kazakhstan

The 'Strategic Development Plan of the Republic of Kazakhstan until 2025' is the main development programme for the country. Kazakhstan recognizes its dependence on fossil fuels and underlines the importance of the development of non-oil sectors (Government of Kazakhstan 2018). The main goal of the strategy is to increase the productivity and diversification of the economy through technological upgrades and digitalization.

Table 2 Key features of the Central Asian NDCs

Country and year of most recent NDC submission	Baseline	GHG emission reduction target by 2030	Renewable energy target	Level of ambition	Likelihood of achieving goals based on historical trends and current challenges
Kazakhstan, 2016	1990	15% ^a 25% ^b	Not stated	Ambitious	Moderate
Kyrgyzstan, 2021	Business as usual scenario	15.97% ^a 43.62% ^b	Not stated	Highly ambitious	Moderate
Tajikistan, 2021	1990	Not exceed 60–70% ^a of 1990s emission level Not exceed 50–60% ^b of 1990s emission level	Not stated	Unambitious	High
Uzbekistan, 2021	2010	35% per unit of GDP by 2030	25% (including small hydro)	Unambitious	High

Note ^aUnconditional and ^bConditional upon external support

The strategy has two sections relevant to the NDC: the initiative on ‘Promoting technology transfer’ and initiative on ‘Development of green technologies.’ The first initiative aims to upgrade the industrial sector with modern global technology to increase the efficiency of the economy. The second initiative explicitly aims to introduce energy-efficient and smart technologies that are in alignment with climate policy goals. This part of the strategy emphasizes the development of renewable energy and decommissioning of old power plants. The strategy also stipulates that national and international financial resources will be mobilized to support green energy investments, including via technology transfer projects and support for the private sector in energy transition.

4.2 Kyrgyzstan

The general goal of the ‘National Development Programme of the Kyrgyz Republic until 2026’ is to improve the well-being of citizens by creating a favourable environment for socio-economic development (Government of Kyrgyzstan 2021a).

The programme has a special section titled ‘Environmental sustainability and climate change.’ This part of the programme stipulates the implementation of ‘green economy’ principles in sectoral policies and mentions two major areas: increase in

energy efficiency and the use of renewable energy. The rest of the section is devoted to conservation of ecosystems and biodiversity, as well as to minimizing environmental damage.

The section also contains eleven dedicated projects which include the development of ‘green economy’ standards, low-emission public transport, biodiversity conservation, forestry, emergency resilience and re-cultivation of mining sites. However, most of the projects are at the subnational level and are unlikely to have a major impact on climate policy in the country. Despite the promising title, the section fails to incorporate the announced climate goals and does not demonstrate ambition in climate change adaptation and mitigation.

4.3 Tajikistan

‘The National Development Strategy of The Republic of Tajikistan until 2030’ has four primary objectives: (a) ensuring energy security and efficient use of electricity; (b) turning the country into a major transit country; (c) ensuring food security and access of the population to quality nutrition; (d) expansion of productive employment (Government of Tajikistan 2016).

To ensure energy security, Tajikistan aims to diversify its energy supply, including through hydro energy expansion, modernization of existing power plants, installation of new oil and coal powered plants, use of solar and wind energy and improvements to energy efficiency and saving. The strategy states that the share of electricity generated from coal, oil, gas and renewable sources must be increased by 10%. Tajikistan, in its development programme, clearly intends to develop a fossil-fuel-based energy sector with a strong focus on the modernization of its energy infrastructure.

4.4 Uzbekistan

‘The Development Strategy for the New Uzbekistan for 2022–2026’ has seven priorities. These include: (1) human dignity and free civil society; (2) rule of law; (3) accelerated economic growth; (4) fair social policy and human capital development; (5) spiritual development; (6) local solutions for global challenges; and (7) national security. In total the strategy has 94 specific and measurable goals (Government of Uzbekistan 2022).

The goal relevant to the NDC is Objective No. 24, ‘Uninterrupted supply of electricity to the economy, active introduction of “green economy” technologies in all areas, increase the energy efficiency of the economy by 20 percent.’ This involves a whole range of measures related to climate policy, such as raising the share of renewable energy in total energy production to 25% by 2030; improving resource efficiency in the industrial sector; widespread adoption of renewable energy sources;

improvement of energy efficiency in housing; and production and use of electric vehicles.

We can conclude that Uzbekistan's national development strategy is in alignment with its NDC. Both documents focus on energy efficiency improvement in the short run and building a basis for renewable energy generation and expansion.

5 Discussion and Conclusion

Climate change creates many risks for the economies of the Central Asian region, and successful adaptation efforts will require effective policies and investment in many sectors. Central Asian countries have submitted their intentions under the Paris Agreement via their NDCs.

Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan are not major contributors to global GHG emissions, but have large climate change mitigation potential through the expansion of renewable energy. They have recently made a number of pledges and declared notable climate policy ambitions. This chapter looked at how well their climate goals are aligned with their national development programmes (Table 3).

The Central Asian energy systems were built during Soviet times and the governments are currently striving to transform the national energy systems to meet the growing energy demand. Historically, fossil fuels have been the main source of energy supply, and in recent years their share has even increased in Kazakhstan, Kyrgyzstan and Tajikistan. Kyrgyzstan has been witnessing a fundamental change in its energy system, where residential consumption became the largest share and largest emitter of GHGs starting from the early 2000s. Facing climate change and crumbling old national energy systems, the governments of the region have announced new policies to upgrade energy supply and improve energy efficiency.

The declared national development plans are siloed by sector and often ignore the findings of climate change impact research. The best example is plans to invest significantly into hydro energy despite the mounting research on looming water stress in the region.

Despite the increasing climate changed-induced water-related risks, the two upstream countries—Kyrgyzstan and Tajikistan—in their national development

Table 3 Summary table

Country	Historical trends (share of RE, emissions, energy intensity) in relation to climate goals	NDC ambition	National development plan alignment with NDC
Kazakhstan	Positive	Ambitious	Generally aligned
Kyrgyzstan	Negative	Highly ambitious	Weakly aligned
Tajikistan	Negative	Low ambition	Not aligned
Uzbekistan	Mixed	Low ambition	Aligned

plans are still heavily focused on the development of new hydropower plants, including both large national dams and small hydro stations. The national energy strategies repeatedly mention the underutilized hydro energy potential and neglect the latest climate change science warnings on water disruptions.

In addition, Kyrgyzstan and Tajikistan seem to be heavily reliant on external support, while Kazakhstan and Uzbekistan have started to deploy renewable energy, set carbon prices and integrate their climate targets into sectoral programmes.

The climate goals of the countries of Central Asia are difficult to compare because they use different base years, metrics and policy measures. Kazakhstan and Tajikistan use 1990 as their base year, Kyrgyzstan uses a business-as-usual scenario and Uzbekistan uses 2010 as its base year.

Kazakhstan has not updated its NDC, yet the country can be considered the region's climate policy leader with actionable climate policy such as intended carbon neutrality by 2060, investment in renewable energy, and the introduction of an emissions trading scheme. With the exception of Kazakhstan, none of the countries has a carbon pricing mechanism, although Uzbekistan's NDC does mention the possibility of introducing carbon pricing.

Kazakhstan and Uzbekistan have taken the first steps towards embracing renewable energy and new technologies while the region's two major hydropower producers—Kyrgyzstan and Tajikistan—still hope to realize their vast hydropower potential. However, the historical trends, NDCs and national development plans for these latter two countries call for an increasing reliance on fossil fuels.

We can thus conclude that Central Asian countries have embraced the global climate change agenda through their signing of the Paris Agreement and declaration of national climate policy targets; however, the countries each rely on different approaches in reaching these targets. Kyrgyzstan and Tajikistan see the GHG reduction obligations as supplementary to their national development, while Kazakhstan and Uzbekistan view their climate commitments as complimentary to the growth of the national economies.

All four countries rely heavily on international partners for financing and technology transfer and have stated that they require such transfer to achieve their climate goals. The current trends and national policies do not suggest that transformational changes in terms of energy transition and GHG emission reduction will occur in the foreseeable future.

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