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coordinated by Dr. Rahat Sabyrbekov

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Project summary: The project aims to develop a module on European Climate Politics at the OSCE Academy in Bishkek. It brings advanced European expertise to Central Asia, where the impact of climate change is significant and where national governments have initiated joint regional action to address it. The aim of the newly developed module is to advance European regional climate policy expertise to inform local stakeholders and policy-making. It will do this through the core course, divided into two parts, and with a series of activities aimed at the wider policy community. The project will foster dialogue between different stakeholders through workshops, including policymakers, NGOs, and academia. This knowledge-sharing will support the improvement of regional climate policies, the development of new educational programs, research initiatives and the raising of public awareness. The project will use the long-standing network of the OSCE Academy within Central Asia and beyond.

Disclaimer:

The present collection of student papers was written a part of the course work in 2024. The grammar and stylistics remained original.

All views expressed in this publication are exclusively those of the authors and are not necessarily shared or endorsed by the OSCE Academy in Bishkek and EU.

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Kyrgyz Legislation Improvement on Green Energy

By Aibek Abdyvasiev

Climate policy is becoming increasingly relevant today. The rapid development of mankind in the 20th century has led to the fact that in the 21st century mankind faces the consequences of such development in the form of negative changes in climate everywhere. People selflessly took the road of momentary convenience, not realizing that such a road leads to the destruction of nature, ecosystem and climate. Toward the end of the 20th century, individual countries began to develop international cooperation to preserve nature and climate and reduce the negative impact on them. The aggregate of such agreements led to the emergence of international environmental law. At the same time, other countries began to adapt their domestic legislation to the existing trends. In general, such policies can be characterized as prohibitions and encouragement. Central Asia, and Kyrgyzstan in particular, is also developing its legislation in this direction. This paper reflects the situation with the development of national legislation of the Kyrgyz Republic in relation to the development of green energy as an element of climate action.

The Kyrgyz Republic first adopted a so-called “green law” on December 31, 2008. It was a law on renewable energy sources. This law has undergone 6 amendments, the last of which was in 2019. For the most part, these changes did not have a significant impact on the legal situation. However, the changes adopted on August 03, 2012 were significant. Thus, it was adopted that all electricity generated using renewable energy sources, which is not consumed by the owner of the installation for its own needs and not sold to other consumers on a contractual basis, must be purchased by the largest electricity distribution company in the administrative-territorial unit where the renewable energy installation is located, regardless of which electricity company's grid the installation is connected to.

However, the law was still not up to date. It was hopelessly outdated and could not be improved by point-by-point changes. This was largely due to the fact that this law was declaratory, but not practical. This means that any normative legal act that establishes the order of legal relations does not detail these legal relations. For their practical application, so-called by-laws are necessary, which in turn disclose in detail the rights and obligations of the participants of legal relations.

Only in 2020, 12 years after the date of adoption of the law on renewable energy sources, the Regulation on the conditions and procedure for the implementation of activities for the generation and supply of electricity using renewable energy sources was adopted. This was the very by-law that detailed the law and established practical conditions for renewable energy activities. The fact that this provision was adopted only 12 years later shows that the authorized bodies of the Kyrgyz Republic in the energy sector simply adopted the law on renewable energy sources for the sake of formality. It is the development of legislation and adoption of acts of practical nature that shows the real intention of the state to develop activities.

In June 2022, 2 years after the adoption of the above-mentioned Regulation on Conditions and Procedure for the Implementation of Activities on Generation and Supply of Electricity from Renewable Energy Sources, a completely new law on renewable energy sources was adopted. Such speed of adoption of normative legal acts suggests that in reality this area of activity is not given due attention. The proof of this assumption is the fact that the new Regulation on the conditions and procedure for implementation of activities on generation and supply of electricity using renewable energy sources was adopted in October 2022. The same year as the new Law on Renewable Energy Sources.

Tatyana Vedeneva of the Center for Renewable Energy Development and Energy Efficiency in her article “Changes for the better in the RES sector in Kyrgyzstan” also confirms the opinion that it was the lack of clear bylaws that prevented further development of the renewable energy sector in the Kyrgyz Republic.

The new regulations in the form of a law and regulations are a significant step forward in the development of green energy in the Kyrgyz Republic. The new acts, among other things, introduce such innovations as the subject of renewable energy sources. Thus the position of persons who are involved in the field of green energy on the part of civil society is legislated. From a jurisprudential point of view, this is a significant achievement.

At the same time, relevant amendments were made to the Land Code and the Tax Code of the Kyrgyz Republic. Thus, the Tax Code exempts elements of equipment for installations imported into the Kyrgyz Republic from taxation. This step contributes to attracting investments to the Kyrgyz Republic as many investors finance the installation of equipment for green energy generation.

On the other hand, the Land Code introduced a requirement to withdraw a land plot issued for construction and installation if such an installation was not installed within the established period of time and the land plot was not used for its intended purpose.

Currently, the state is consistently developing the energy complex. Thus, in the south of the Kyrgyz Republic, the President opened a small hydroelectric station. At the same time, the President noted that investors have already been found for the construction of the Kambar-Ata-1 hydroelectric station. However, it should be noted that the legislation on investment for a long time did not meet the threats of counteraction from unscrupulous civil servants. This very problem has been an obstacle to investment in the country's economy. Quite recently, the President signed a law on strengthening the protection of investors and entrepreneurs. Thus, liability for obstruction of legitimate business activities by an official using his official position has been established.

These changes indicate the intention of the Kyrgyz Republic to move forward in solving climate problems, at least in terms of clean energy development. However, in general, the state of ecology of the Kyrgyz Republic leaves much to be desired. For example, Bishkek year after year leads the rating of cities with the highest level of air pollution. There are no initiatives in this direction, neither from the point of view of legislation nor from the practical point of view. It should be noted that qualitative changes are needed. If the above described was related to incentives, then in terms of environmental safety, changes are needed in the form of increased penalties and bans. This should apply to the automobile component, heating resources.

Abundance Amidst Crisis: An Analysis of the Central Asian Water Paradox

By Seitek Arkabaev

Despite being endowed with significant water resources, the region is grappling with a crisis. This paper investigates the roots of this paradox, attributing the crisis not to scarcity, but to mismanagement and ineffective regional cooperation. The underlying factors contributing to the crisis are multifaceted, spanning natural and historical factors, political implications, socio-economic dynamics, and climate change. The historical shift from centralized Soviet-era water-energy exchange systems to sovereign management post-independence has proven detrimental. Political ambitions and issues of national sovereignty often overshadow the need for collaborative management, exacerbating the crisis. Furthermore, inadequate irrigation practices and the detrimental effects of climate change compound the issue. This research underlines that while the challenges are significant, the crisis is fundamentally a management issue. Hence, understanding these dynamics can guide more effective policy interventions and pave the way for sustainable and cooperative water management in the region.

Water plays a pivotal role in the socio-economic fabric of society, influencing agriculture, industry, energy generation, and ecosystem sustainability. However, despite its abundance in many regions, it can still give rise to a crisis if not appropriately managed. This paradox is particularly evident in Central Asia, that is rich in water yet simultaneously grappling with a water crisis. The hydropotential of a part of the region is so huge that, with proper use, it can cover the energy needs of all five states. However, today the region is a clear-cut example of wherein abundance coexists with scarcity. Despite the rich water resources, the region is facing a crisis marked by frequent shortages, disputes over sharing, the deterioration infrastructure and not only. Central Asia provides a compelling case study to understand this paradox. It opens up the exploration of how mismanagement, political considerations, socio-economic dynamics, and climate change can collectively contribute to the emergence of a water crisis even in a region replete with water.

"Despite being rich and abundant in water resources, why is the Central Asian region experiencing a water crisis?" reference? By unraveling causes, this essay aims to shed light on the intricate interplay of the various factors that have affected current state of affairs.

The region is indeed rich in water. Nevertheless, one of the main underlying issues is that Central Asia's water system was customized in the Soviet era to serve the whole region as a single unit, not to mention the natural distribution of hydro potential among the states with 80% of reserves being in Kyrgyzstan and Tajikistan. This have been a **bone of contention repeatedly, with national interests preceding over regional**. Tajikistan and Kyrgyzstan are striving to increase the productivity of hydroelectric power plants, reduce energy dependence on hydrocarbons from Kazakhstan and Uzbekistan and expand electricity exports, while lowland states are interested in irrigation, rather than the energy mode of "upper" power plants to meet own needs. The problem of inefficient water management is further exacerbated by a lack of adequate regulatory framework and internal political dynamics, since each state enacts laws in a way, that in most cases doesn't "fit in" with the acts of neighbors. Apart from political dynamics, socio-economic factors are also critical. Problems with water are great even in water rich states of the upper stream. For instance, in the Kyrgyz Republic alone there are more than 700 thousand people without access to drinking water, and 40% water pipes and equipment that are worn out. As an expert Ryskul Usubaliev says: "... *the lack of water is already leading to conflicts between auls and villages within Kyrgyzstan itself*". The deterioration of irrigated lands, improper irrigation techniques, and the use of low-quality water for field irrigation have taken a toll on the region's water resources. What is more, the deterioration of Soviet infrastructure leads to losses of water which amount up to 50%. Despite the huge potential, the country hardly provides electricity to the domestic market. For example, in 2021, Kyrgyzstan agreed with

Kazakhstan and Uzbekistan on the supply of electricity in the amount of 1,650 million kilowatt-hours, in exchange for the discharge of water in the summer months. The once effective mechanism of trade-off, which worked under the centralized Soviet system, has now been rendered ineffective due to nationalistic ambitions. And all this is against the background of melting glaciers and desertification caused by climate change, not to mention the rapid growth of the population, which instead of 75 million today in Soviet times was about only 50 million.

The solution necessitates a shift in perspective, from seeing water resources as a matter of national security to seeing it as a matter of global sustainability. Regional cooperation and shared decision-making, supported by a robust legal framework, can play a crucial role in mitigating this crisis. Addressing the water crisis calls for a paradigm shift in approaches, underscored by two contrasting perspectives on the solution. The first argues for obtaining hydro resources from abroad by altering the courses of voluminous rivers and constructing the necessary structures. Contrarily, the second perspective argues that the problem is not tied to a lack of resources per se. According to the facts provided before, the crux of the issue lies in improving the utilization and management. Experts from Germany emphasize that in no other region of the world is there such an urgent need for the development of interstate cooperation. According to the Food and Agriculture Organization, the reserves of water in the Central Asia, per capita, are sufficient (around 2,300 cubic meters). Thus, the issue is not a deficit, but rather a mismanagement. Thus, focus should be made on technical and political fronts. On the technical side, efforts should be made to modernize irrigation systems and building new hydro-technical structures to control spending. While political efforts should focus on fostering regional cooperation. This change needs to be accompanied by a reconsideration of existing strategies. Even in Kazakhstan, further economic strategies are planned according to the old approach, presuming abundant water availability. It is necessary to acknowledge the changing reality and incorporate efficient use and conservation of water into strategic planning. The era of using water is passing, it is now time for storing and conserving water. The full implementation of integrated management into the practical activities of all economic actors and the population is essential. Signs of progress towards this are emerging, as seen with Kazakhstan, Uzbekistan, and Kyrgyzstan signing a memorandum in January 2023 on the construction of the Kambarata HPP-1 on the Naryn River. This demonstrates that the parties can find conflict-free formats of interaction and execute preparatory stages of large-scale hydroelectric power projects, offering a beacon of hope for the region's water crisis.

This research has demonstrated that the crisis is less about the availability and more about the management. Shared decision-making over resources can serve as a win-win for all. However, achieving this will require states to prioritize common security over national concerns. In the face of international tension, regions and states tend to focus on chronic internal problems. In this case, given its complexity, the water crisis can unleash many "black swans" for us. However, it is essential to understand that there is enough water for everyone; it simply needs to be managed rationally. This research supports the view that the Central Asian water crisis is primarily rooted in mismanagement, policy failure, and political disputes. A shift in focus from national interests towards regional cooperation and sustainable water management practices could play a significant role in resolving this crisis.

The last point that deserves more attention than it was given in this context is an urgent need for Central Asian states (especially up-stream "stans") to reinvent their energy development strategies, which are based on heavy reliance on development of the hydropower, that are becoming irrelevant as the temperature rises. However, this question deserves a separate attention itself.

The Feasibility of Kazakhstan's Target to Become Carbon-Neutral by 2060

By Assylbek Assylkhanov

In 2020, at the Climate Ambition Summit, Kazakhstan, in a historic first, manifested its aim to become a carbon-neutral state by 2060. As the country's largest energy source comes from coal, oil, and natural gas, the feasibility of the goal may be perceived sceptically. The production of fossil fuels plays a vital role in Kazakhstan's economy. Especially, oil exports significantly contribute to the country's Gross Domestic Product. For instance, the simple examination of the relationship between the price of Brent oil and the GDP value demonstrates the direct impact of the fluctuations in oil prices on Kazakhstan's economy (Figure 1). Thus, we may question, how realistic is it that a country with a 6,5% share of renewable energy sources in 2024, and increased dependence on fossil fuels, will achieve carbon neutrality by 2060?

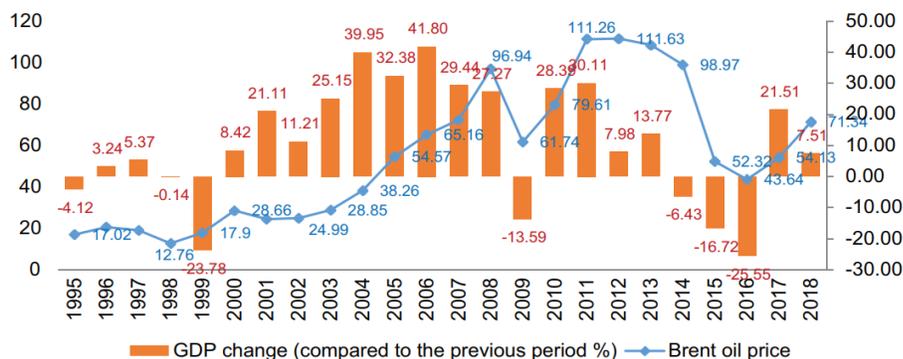


Figure 1. Brent oil price and GDP change of Kazakhstan

The intense production linked to nonrenewable energy makes Kazakhstan the 14th largest carbon dioxide emitter in the world. However, despite the fossil fuel-dependent economy, Kazakhstan's commitment to Climate Action is strongly supported by incentives and investments in the Green Economy. Throughout its history, the country aligned itself with the international agreements of UNFCCC, the Kyoto Protocol and the Paris Agreement. Moreover, recently, Kazakhstan has become a Partner in the Global Carbon Pricing Challenge (GCP), which intends to "...cover 60% of the world's emissions with carbon pricing by 2030". Taking into account the existing role of fuels in the economy of Kazakhstan, commitments that bind the country to international agreements and the current initiatives that guide the country towards a Green Economy, it is imperative to examine the feasibility of becoming a carbon-neutral state in the next 35 years.

After the Russian invasion of Ukraine and followed economic sanctions of the West against Russia, the export of fossil fuels from Kazakhstan, especially for Europe, became more tempting. For instance, the amount of oil exported by Kazakhstan bypassing Russia became 1.8 million tonnes, in 2022, which is 638 thousand tonnes more compared to the previous year. Despite the growing interest in the import of fossil fuels from Kazakhstan, in the long term, it is more complicated for the country than it looks due to the regulating international agreements. For example, according to the World Bank, the European Union's Carbon Border Adjustment Mechanism (CBAM) can negatively affect the profits of Kazakhstan from the export. Based on estimates, "...Kazakhstan could lose over \$250 million a year in export earnings due to CBAM, with the iron and steel sector at most risk. These losses could rise to \$1.5 billion in the future if CBAM is expanded to include oil". However, the export of fossil fuels continues to rise. Particularly, the export of oil increased by 10 per cent in 2023 in comparison with 2022, and despite the drop in revenue, it is planned to increase the oil export more in 2024. Such focus on the development of the fossil fuel-dependent economy does not correlate with Kazakhstan's aim to reach net zero in less than four decades.

On the other side, Kazakhstan is also engaging in numerous global Climate Action initiatives. For instance, it is the first and so far, only Central Asian state that implemented the Emissions Trading System as an incentive for greenhouse gas reduction. In 2022, KAZ ETS grasped approximately 50% of carbon dioxide emissions "...stemming from 201 installations in the power, centralized heating, extracting industries, and manufacturing sectors". All these agreements serve as an incentive for Kazakhstan to move towards a Green Economy and transition from fossil fuels.

One of the vital climate actions for transitioning towards carbon-neutrality is the development of renewable energy sector. By 2024, Kazakhstan established 148 amenities for the generation of wind, solar, hydroelectric and bioelectric power. The development of the infrastructure for the production of the renewable energy also engages foreign investments. In 2023, local authorities participated in the dialogue between the Chinese "Sinohydro" and Kazakh "TechnoGroupService", where parties discussed the potential investment of one billion USD for building wind power plants. This contribution is especially significant for improving the potential of regions with strong winds. Besides, the development of wind power plants, the geographical territory of Kazakhstan is also very convenient for the generation of solar power. As we can see in Figure 2, the Southern part of Kazakhstan has a high photovoltaic power potential of 4.2-4.4 kWh daily total. Furthermore, the costs of the production of renewable energy are becoming cheaper over time and the cost of energy produced by onshore wind and solar photovoltaic is currently at 0.03 USD per kWh and 0.05 USD per kWh, respectively, which is already below the low-end price of fossil fuels production. These conditions create a convenient opportunity for Kazakhstan to invest in the transition to the green energy, simultaneously balancing the fossil-fuel-dependent economy. On top of that, the abundance of natural resources in Kazakhstan also plays a vital role in Climate Action, and the availability of transition minerals contributes to the development of technologies and infrastructure for achieving carbon neutrality. However, according to the Climate Action Tracker, Kazakhstan's comprehensiveness of the net zero targets by 31 January 2024 is being ranked as "average" with the lack of coverage in international aviation, reduction actions outside of its borders, review cycle establishment, and fairness within the targets on achieving carbon neutrality. Undeniably, Kazakhstan's economy is vastly reliant on the production of fossil fuels due to its abundance and international demand. Rebuilding the economy that historically been relying on the production of fossil fuels is not an easy task, but we at least see the movement towards the Green Economy.

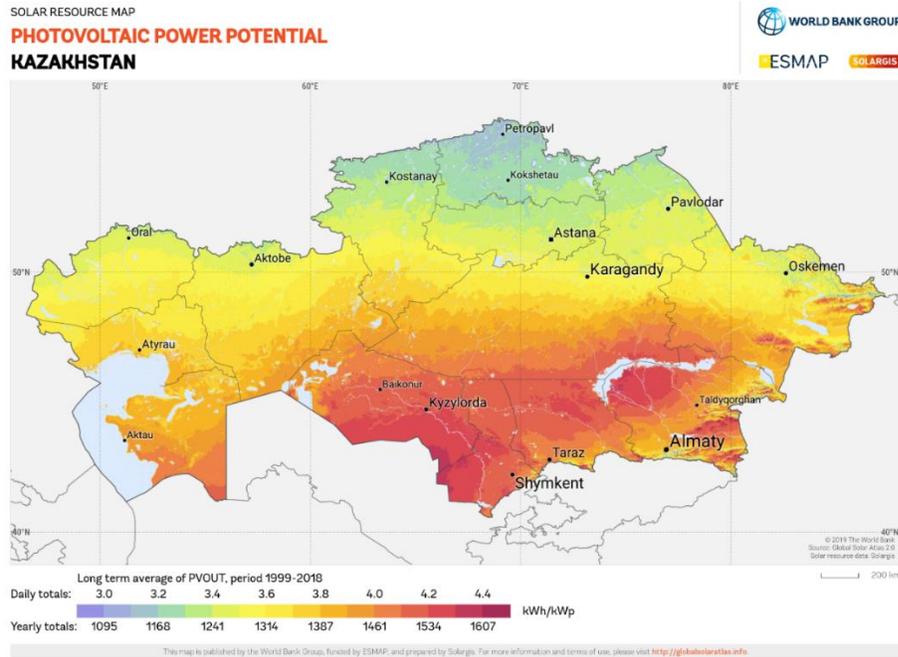


Figure 2. Photovoltaic Power Potential of Kazakhstan

At the dawn of its independence, Kazakhstan was able to use the availability of fossil fuels for the effective acceleration of its economy. As the country benefited from the wealth of traditional energy sources, it parallelly advanced its alignment with international regulations for addressing climate issues. Considering the commitments of Kazakhstan to achieve carbon neutrality and reduce the level of emissions coming from greenhouse gases, in the long term, the diversification of the economy by Climate Actions can be much more favourable. As above-mentioned, Kazakhstan possesses the necessary geographical features and financing for the successful implementation of the technology for renewable energy production. Especially, with the prices of the production of renewables going lower, the relevance of elevating the role of Climate Action without the economic loss for Kazakhstan does not seem as distant as it used to be. However, rebuilding the economy for aligning it with the net zero target seems too ambitious to achieve in less than 40 years. Many opportunities and initiatives in Kazakhstan support the movement towards carbon neutrality, but the movement itself is not as fast as the urgency of climate risks requires. Thus, it is significant to enhance Climate Action in Kazakhstan not only to contribute to the global efforts in addressing climate issues but also to secure long-term economic growth in the country.

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EU Farm to Fork strategy and its applicability to Kyrgyzstan

By Begimai Abdraeva

Introduction

Currently one of the primary goals of every state is achievement and promotion of sustainable development. Food is one of the most important part of our lives and is the biggest sector in the world. Therefore, development and building of sustainable food systems is key priority in climate change agenda.

Currently European Union (hereinafter EU) is considered as pioneer in transformation towards sustainable production and consumption. The EU Farm to Fork Strategy is a revolutionary initiative aimed at transforming the traditional food systems into sustainable and resilient models. Developed in 2020, this comprehensive strategy encompasses a wide range of measures and objectives, all with the ultimate goal of ensuring healthier and more environmentally-friendly food production, distribution, and consumption practices. The Farm to Fork Strategy represents a significant step forward in addressing the pressing challenges of food security, biodiversity loss, climate change, and public health.(Mowlds, 2020)

Farm to Fork strategy is the part of the immense initiative that EU called Green Deal. One of the goals of the Green Deal is to be an example for other countries, how the policies should be structured and realizes towards sustainable development and decrease the impact of climate change. Kyrgyzstan and many other developing countries can analyze and use the EU policies, however every policy or strategy that are taken from other countries and regions, should be adapted and tailored in line with national, cultural and other considerations. The aim of this paper is to identify to what extent current EU policy on sustainable food systems is applicable to Kyrgyzstan.

EU Farm to Fork Strategy

In general, the strategy could be divided into 5 areas. The major area is focused on sustainable production and agri-food systems. At the main aim of the Farm to Fork Strategy is to foster sustainable practices in agriculture. The EU committed to decrease the use of chemical pesticides, antibiotics, and fertilizers while moving towards organic farming. The strategy promotes the adoption of diversified crops, crop rotation, and precision agriculture to improve soil health, safeguard biodiversity, and minimize the environmental impact of farming. Moreover, it seeks to support small-scale farmers to promote sustainable practices among them. (Union, 2020)

Also, the strategy aims at strengthening supply chains and reducing food waste. The EU strategy points out that food supply chains should be efficient and resilient. The objective is to improve traceability, transparency, and the exchange of information throughout the entire food system. Recognizing the complexity of the supply chain and its impact on various sectors, the strategy emphasizes the benefits of shorter and more localized supply chains. It also aims to decrease carbon emissions linked to transportation and enhance the system's resilience. According to FAO the annual world food waste accounts to 14% of annual food production .(FAO, 2019). Therefore, a crucial goal of the strategy is to address the issue of food waste by reducing losses and waste across the entire value chain, from production to consumption. (Union, 2020)

The third area of the EU strategy is promotion of healthy and sustainable diets. EU understands the importance of healthy and sustainable diet, therefore, the Farm to Fork Strategy regulates provision of accurate and transparent information on food labels, enabling individuals to make well-informed choices.

Also, it encourages the adoption of plant-based diets, acknowledging their potential to mitigate the environmental impact of food production. (Union, 2020)

The progress of strategy relies heavily on continuous research, innovation, which cannot happen without adequate investment. The EU allocates significant resources to foster research and development in sustainable agriculture, alternative proteins, and food processing technologies. It is assumed that innovation will promote further adoption of sustainable practices, reduce production costs, and promote the competitiveness of the European agri-food industry. (Union, 2020)

The last but not the least is international dimension and diplomacy. Food industry cannot be isolated only within EU, therefore international cooperation is considered as important element of the Strategy. EU puts efforts on promotion of the sustainable agricultural practices beyond Europe's borders and engage in dialogues with international partners to address global challenges. The strategy also strives to promote fair trade practices, advocating for the importation of sustainably produced food while discouraging deforestation and other unsustainable practices associated with food production in foreign regions. (Union, 2020)

Food industry of the Kyrgyz Republic

Kyrgyzstan is small developing country located in the heart of Central Asia. As any developing country Kyrgyzstan faces different challenges, where food industry takes one of the main parts. According to World Food Program (WFP) the food sector of the Kyrgyz Republic, 15% of the households are food insecure and 54% of the population are marginally food secure. (Alymkulov, n.d.) According to the WFP country strategy for 2023-2027 the following SDG goals are aimed to achieve:

1. SDG target 2.1: Access to food
 - a. Strategic outcome 1: People are better able to meet their urgent food and nutrition needs
 - b. Strategic outcome 2: People have better nutrition, health and education outcomes
2. SDG target 2.4: Sustainable food system
 - . Strategic outcome 3: People have improved and sustainable livelihoods
3. SDG target 17.9: Capacity building
 - . Strategic outcome 4: National programs and systems are strengthened. (Alymkulov, n.d.)

The above-mentioned program already has elements of EU strategy; however EU strategy is considered as more extensive and global.

Strategy applicability in Kyrgyzstan

It is believed that Kyrgyzstan, with its diverse ecosystems and rich biodiversity, can benefit from adopting sustainable agricultural practices promoted by the Farm to Fork Strategy. Encouraging agroecological farming methods, reducing chemical inputs, and promoting soil health can help preserve biodiversity, protect water resources, and reduce pollution. This approach aligns with Kyrgyzstan's efforts to promote sustainable land management practices and safeguard its natural environment.

Kyrgyzstan has a strong tradition of local, family based and small-scale farming (Organization, 2022), and the Farm to Fork Strategy's emphasis on shorter supply chains and supporting local producers aligns well with the country's agricultural landscape. By promoting local production and consumption, Kyrgyzstan can enhance food security, reduce dependence on imports, and support the livelihoods of small-scale farmers. Strengthening local food systems can also contribute to preserving traditional farming practices and cultural heritage.

Currently the promotion of healthy diets should be the main priority of Kyrgyz government. The government can impose regulation on provision of full information to consumers to help them with their nutrition.

It is believed that current state of Research and Innovation in Kyrgyzstan is on embryonic stage as the level of investment is not significant. However, the country should understand importance of such initiatives.

Conclusion

Overall, the EU Farm to Fork strategy should be applied in Kyrgyzstan as well. However, it should be tailored with consideration of current economic and social capabilities of the country. By developing unique national food strategy with reference to leading strategies as EU could provide Kyrgyzstan with great outcomes and sustainable agri-sector.

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Cryptocurrency Gold Rush: The Dark Environmental Footprint of Crypto Mining in Kazakhstan

By Dana Ubaidolla

Cryptocurrencies, digital assets secured by cryptography, have gained notoriety for their complexity and volatility, attracting criminal activity. The crypto mining industry started in 2009 with Bitcoin, created by Satoshi Nakamoto, which remains the most prominent and lucrative cryptocurrency. While initially criticized, some countries, including Kazakhstan, have begun to welcome crypto miners. Kazakhstan has become the third-largest global hub for Bitcoin mining. This boom has boosted the economy, with mining contributing approximately 9 billion tenge to the budget, but it has also led to increased carbon dioxide emissions due to higher electricity consumption. This essay will explore the impact of mining on electricity use and CO2 emissions in Kazakhstan from 2021 to the present.

When it all began: China's Ban on Crypto Mining and Kazakhstan's Rise

In 2018, China began directing bitcoin mining operators to leave the country, leading to a complete ban on all cryptocurrency transactions and mining in 2021. This policy shift caused China's share of global Bitcoin mining to decrease from 75.5% in September 2020 to 46% in April 2021. Consequently, many Chinese miners relocated to more favorable countries, including Kazakhstan.

Kazakhstan quickly became an attractive destination for these miners due to its abundant and inexpensive energy resources. With electricity tariffs as low as \$0.03-\$0.04 per kWh, the country offered some of the cheapest energy costs globally. Additionally, Kazakhstan provided other advantages, such as straightforward legal entity setup, a supportive legal framework, tax incentives, and political stability. Moreover, Kazakhstan, recognizing the potential to benefit from the crypto mining business following the massive migration of miners, has shifted its official stance from the skepticism of 2018 to welcoming crypto activities by establishing a legal framework for them starting in 2021.

The extreme rise in crypto miners is evident. From 2020 to the end of 2022, digital miners were subject to a notification procedure in accordance with the Law on Informatisation and the rules for informing about digital mining activities. Due to the simplicity of this procedure, many crypto mining companies eagerly registered. As shown in the diagram below, the number of cryptominers increased tenfold, from 27 at the start of the period to 297 by December 2022 (see Figure 1).

Figure 1: Registered crypto mining companies in Kazakhstan between 2021 and 2022

Майнинговые компании в Казахстане



* данные на 15 декабря

** В число компаний, предоставивших инфраструктуру, входят data-центры и компании, владеющие сетями. 27 data-центров также ведут майнинговую деятельность.

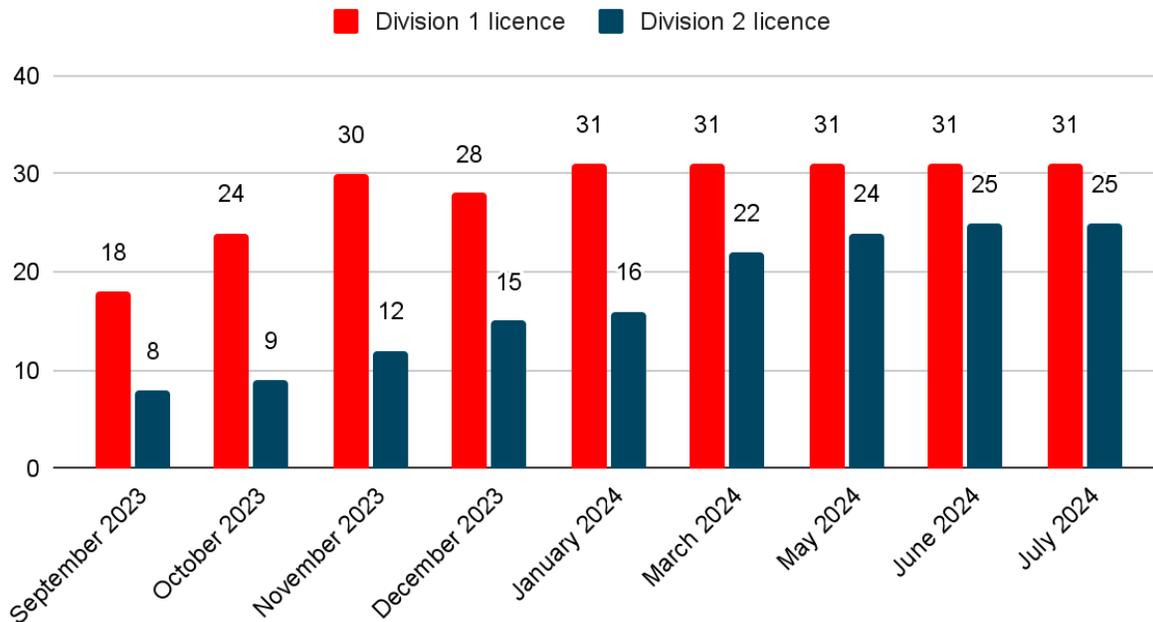
Расчёты Ranking.kz на основе данных МЦРИАП РК

Source: Figure reproduced from [Ranking KZ](https://www.rating.kz).

However, starting in 2023, regulations tightened, requiring companies to obtain a license to operate legal crypto mining activities. Consequently, there was a significant decrease from 297 registered crypto miners in December 2022 to just licensed 26 in September 2023. The number is now rising again, with 56 crypto miners currently legally registered in Kazakhstan (see Figure 2).

Figure 2: Licensed crypto mining companies in Kazakhstan between 2023 and 2024

Licensed Digital mining companies



Source: Data taken from reports of the Ministry of Digital Development, innovations and Aerospace Industry of the Republic of Kazakhstan.

Unfortunately, there are also gray miners who have not registered or obtained a license and are operating illegally. The exact number of these miners is unknown.

Energy Consumption in Kazakhstan

While all of the aforementioned crypto miners bring economic progress to the country, they also consume a considerable amount of energy. According to KEGOC, in the first nine months of 2021 as a whole, electricity consumption increased by 11.8% in the southern zone, 5.8% in the northern zone and 6.6% in the western zone compared to the same period in 2020. This surge in demand, driven largely by crypto miners' operation, turned Kazakhstan from a net exporter of energy into a country facing energy deficits. Power cuts occurred in several areas, forcing the national utility to buy electricity from Russia at inflated prices. These shortages led to localized blackouts, exacerbating existing tensions over corruption, nepotism, and rising fuel costs. In January 2022, these issues boiled over into mass protests. In the same year, official figures from Kazakhstan's ministries report that only legal crypto miners consumed 1.55 billion kWh, constituting 1.4% of the country's total electricity consumption.

The government responded to the surge in energy consumption by cutting miners off from the national grid, bringing the crypto mining boom to an abrupt end. In 2023, new regulations were implemented that required

digital miners to connect to the grid through substations with a permitted capacity of at least 35 kW and to become wholesale market participants, consuming at least 1 MW of electricity. Additionally, if fossil fuel-generated (cheap) electricity is used, a high rate of charge will apply, with an upper scale of 25 tenge. Conversely, if renewable (expensive) electricity is used, with a cost per kilowatt hour of 24 tenge and above, a minimum charge rate of 1 tenge will be applied.

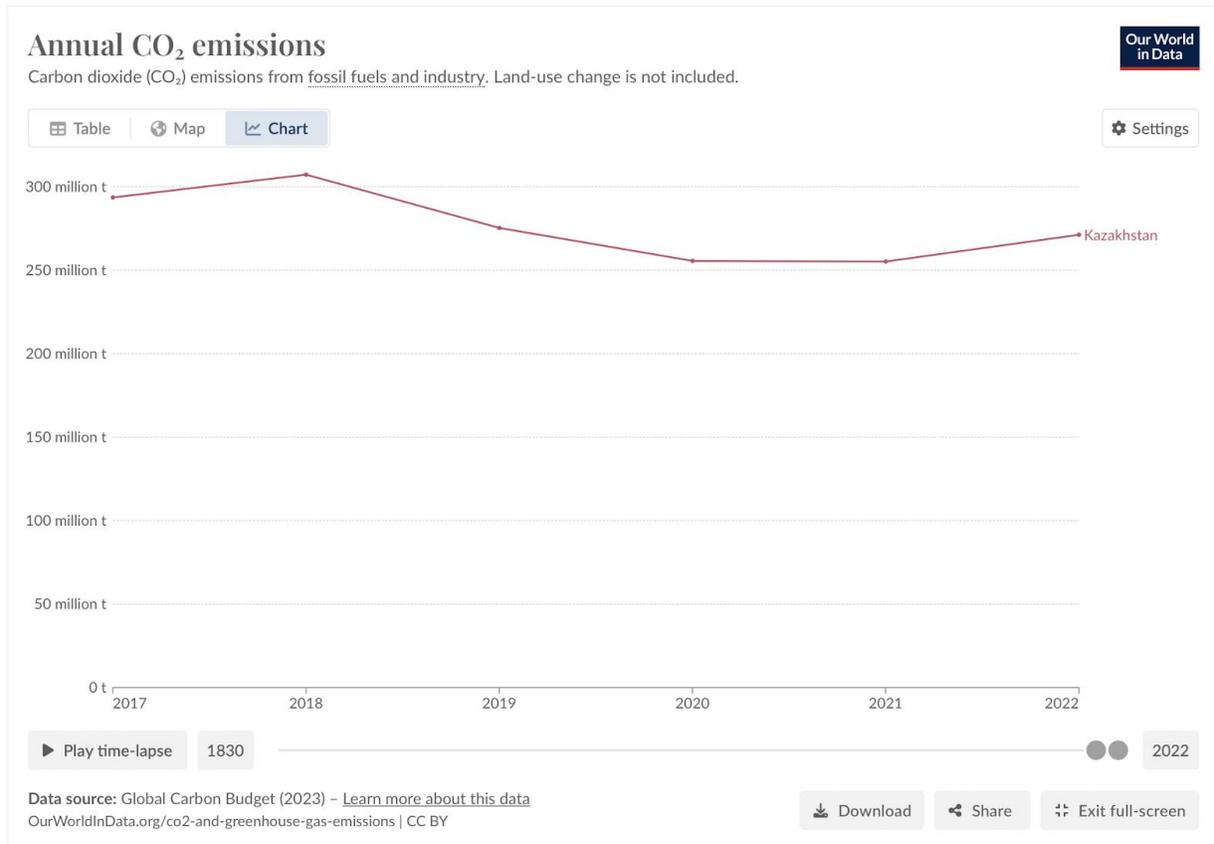
These measures are believed to reduce the use of electricity, prevent energy deficit, and save energy for critically needed infrastructure. However, they have led some investors to consider building small coal plants with capacities of 50-100 MW. While these regulations should decrease electricity consumption by crypto miners, they introduce new challenges, such as the construction of small coal plants, which will still emit greenhouse gasses.

Crypto mining activity and CO2 emissions

All of the aforementioned electricity is produced by fossil fuels, as coal represents around 50% of Kazakhstan's energy mix, followed by oil and natural gas, each with a 25% share. These fossil fuels are used to mine Bitcoin in Kazakhstan, making it one of the worst countries in terms of carbon intensity. This is evidenced by the total estimated emissions from crypto mining operations in Kazakhstan, which amount to 9.2 million metric tons of CO2 annually. This is roughly equivalent to adding 2 million gas-powered cars onto the road.

As we can see, crypto mining activities have a significant impact on CO2 emissions. The latest data on carbon emissions, illustrated in a graph from Our World in Data, shows a similar trend to the level of electricity consumption in Kazakhstan for the same years. There was a gradual decrease in emissions from 2018, stabilization between 2020-2021, and a slight increase from 2021-2022, reflecting the electricity footprint of crypto miners.

Figure 3: Annual CO2 emissions of Kazakhstan between 2017 and 2022



Source: Figure reproduced from [Our World in Data](#).

Conclusion

Crypto mining is one way for Kazakhstan to diversify its economy and aligns with the Kazakhstan 2050 agenda on digitalization. However, this activity consumes significant amounts of electricity, contributing to energy deficits and causing several blackouts. These developments have not met the population's expectations and conflict with Kazakhstan's carbon neutrality goals, given the high carbon intensity of the industry.

To address these issues, Kazakhstan introduced several regulations, but crypto miners continue to consume energy from fossil fuels. One proposed solution is the construction of a nuclear power plant, which would provide sufficient electricity for crypto miners without raising energy costs. This approach allows the government to support the crypto mining industry using "available" renewable energy while advancing their plans for nuclear energy development.

In conclusion, while crypto mining offers economic opportunities and aligns with Kazakhstan's digitalization goals, its environmental impact poses significant challenges. Balancing economic growth with sustainability remains a critical task for the country as it seeks to develop innovative solutions to meet both energy demands and environmental objectives.

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Urban Climate Policies: Lessons from EU Cities for Central Asia

By Karina Efimova

Sustainable urban management is vital for effective climate change adaptation and mitigation. As urbanization continues to accelerate globally, the adoption of sustainable practices is essential for adaptation and mitigation of climate change, and building resilience. The European Union (EU) has been at the forefront of implementing comprehensive urban climate strategies, setting a benchmark for cities worldwide. Against this backdrop, cities in Central Asia are facing many challenges such as air pollution, congestion of roads, loss of green spaces, rapid population growth, socio-economic inequity, limited civic participation in environmental governance, etc., and therefore they have a necessity of learning from EU experience. In this paper, we will take a closer look at the cases of Amsterdam and Copenhagen for EU countries, and what implications can be for the cities of Central Asia.

On regional level, there are numerous policies that address the development of sustainable cities. For example, one of the key policies in urban sustainability is Sustainable Urban Mobility Plans (SUMP), which aims to encourage the Member states to enhance the development of sustainable transport systems, that are “*safe, accessible, inclusive, affordable, smart, resilient, and emission-free*”. The initiative targets cities of all sizes to embrace its framework in promotion of achieving low and zero emission mobility. Cohesion Policy is also a prominent example, which uses such instruments as the European Urban Initiative (EUI) to help the cities to bring in innovative solutions, capacity building, and gather knowledge on sustainable urban development. The Urban Agenda deserves separate attention, as this policy is aimed at working on both regional and national level and legislation, therefore creating both vertical and horizontal links among stakeholders. All of these policies correspond to the EU Green Deal, and are aimed at building knowledge, finding innovative solutions, and creating connectivity among key stakeholders.

There are also examples of particular cities which are using a variety of sustainable practices in urban management. According to the Arcadis Sustainable Cities Index, key data points for measuring urban sustainability include air pollution, waste management, and investments in low-carbon infrastructure, such as renewable energy and sustainable transportation. Additionally, economic performance, social equity, and resilience to natural disasters are also important factors. According to this index, Amsterdam is ranked as most sustainable city in 2024, followed by Rotterdam, Copenhagen, and Frankfurt.

Amsterdam is pioneering circular economy practices, focusing on reducing waste and maximizing resource efficiency, as well as engaging the community and private sector. The program “Amsterdam Smart City” addresses such areas as housing, mobility, public facilities, open data and work in order to improve sustainability of the city. All of the areas address the issue of community engagement in building sustainable city – for instance, the housing area implies using smart meters for measuring the energy consumption of households, which would allow the residents to regulate their energy usage, and the mobility area covers efforts of integrating work and mobility through Smart work centers - flexible coworking spaces scattered across the city. This approach reduces commuting, cuts congestion and pollution, and supports start-ups by easing land pressures. The public-private partnership here plays a pivotal role, and such actors as government, businesses, knowledge institutions, and social organizations make the initiative possible to realize.

Copenhagen has set an ambitious goal of becoming the first carbon-neutral capital city by 2025 through a holistic approach to climate action. The region of the city accounts for 40% of Denmark's GDP, and, was able to sustain economic growth, while also improving its environmental performance and becoming the global leader of the green economy. The CPH 2025 Climate Plan aims to bring innovations in four key

areas, such as energy consumption and production, mobility, and initiatives of the city administration. The strong part of this strategy is the way it includes key actors – CPH 2025 is developed and implemented in cooperation with the citizens of the city, businesses, NGOs and professional institutions. The inclusion of the citizens in the climate plan brings large benefits, as the citizens themselves are willing to use renewable energy sources in households, ride on bicycles, and sort the waste.

If we consider key datapoints of measuring sustainability of the cities by Arcadis Sustainable Cities Index such as: 1) air pollution; 2) waste management; 3) investments in low-carbon infrastructure (renewable energy and sustainable transportation), we see the following situation in Central Asia:

1. Air pollution in cities is one of the biggest environmental challenges in Central Asia. According to the 2023 World Air Quality Report, Tajikistan's capital Dushanbe ranked 4th place worldwide, followed by Tashkent, Uzbekistan, on 22d place; Bishkek, Kyrgyzstan on 29th place; and Astana, Kazakhstan on 52d place. Data on Ashgabat, Turkmenistan, was not presented in the ranking, but the US AQI is 190, with air pollution level being indicated as unhealthy (real-time data). The capitals of Central Asia significantly exceed the WHO PM2.5 annual guideline.
2. According to Waste Management Outlook for Central Asia, countries of Central Asia have made a significant progress in waste management in past decades. However, a significant issue prevails – much of the municipal waste goes to landfills that do not meet the modern standards. As highlighted in the report, a significant issue of that remains in ineffective local strategies, as well as lack of funding and knowledge.
3. Development of sustainable infrastructure varies from country to country and from city to city, however largely this area remains underdeveloped. For instance, urban planning in CA countries is still largely based on the principles of Soviet models of urban development, which also do not correspond to modern standards of efficient urban planning; poor development of public transport is a reason why many citizens prefer using personal cars (80-90%), which in turn leads to congestions on roads and air pollution; and local governments do not have much budget or competence to develop the cities sustainably, as the power in CA states is still largely centralized.

As it can be seen, Central Asian cities are on different places in their way towards sustainability. However, more action is needed in order to build resilience. EU approach to sustainable cities offer several valuable lessons for CA countries:

1. First of all, effective policy frameworks and governance models are essential, as demonstrated by the EU's SUMP, EUI, Urban Agenda, which all tie into a Green Deal. In contrast, Central Asia currently lacks comprehensive policies on urban sustainability, which later suffer from poor (or even absence of) implementation.
2. Public engagement and community-based approaches, such as in both Amsterdam and Copenhagen, can enhance the effectiveness of climate policies, as they include whole population into being a part of the solution. This is often omitted in case of CA countries, where governance is mostly centralized and local authorities have less power.
3. Additionally, regional cooperation and knowledge exchange among the CA countries could foster a collaborative approach to urban climate challenges – cities in Central Asia experience similar issues, meaning that cooperation can facilitate the process.

To conclude, Central Asian cities need to work on development of sustainable cities' policies, as the urban areas are crucial for climate change mitigation and adaptation. Currently, EU cities offer valuable lessons through their experience – comprehensive policies both on regional and local level and inclusion of key

stakeholders, such as citizens, businesses, NGOs, local authorities and knowledge institutions are necessary for creating resilient cities.

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Carbon Pricing Mechanisms in Central Asia

By Tolgonai Elemanova

Climate change poses a significant threat to the global environment and economy, with Central Asian states being no exception. Transitioning to carbon neutrality is crucial for Central Asia as climate change-induced glacier melting threatens water supplies. The melting glaciers will reduce surface water runoff, risking ecological catastrophe for the region, particularly as main freshwater reserves in Kyrgyzstan and Tajikistan supply Kazakhstan, Turkmenistan, and Uzbekistan. Experts warn that by 2030, water supply could drop to a critical 1.7 thousand cubic meters per year, far below the minimum required 500–700 million cubic meters, endangering agriculture as 50-90% of irrigated lands are already. Additionally, Central Asian states have committed to reducing greenhouse gas (GHG) emissions under the Paris Agreement with the aim to decrease annual emissions by an estimated 13 to 21 percent by 2030, contingent on the availability of external support. Implementing a carbon price mechanism, which imposes a fee on the carbon content of fossil fuels, has been proposed as a potential solution to mitigate climate change. This essay examines whether a carbon price can effectively reduce the climate burden of Central Asian states, considering its pros and cons.

Carbon pricing mechanisms aim to reduce GHG emissions by assigning a cost to emitting carbon dioxide (CO₂). The two primary forms of carbon pricing are carbon taxes and ETS. Among all of the five Central Asian states, Kazakhstan is the only country in the region implementing a carbon price in the form of the Emission Trading Scheme (ETS). While ETS and carbon taxes are collectively known as carbon pricing, they function differently in practice. A carbon tax sets a direct price on emissions and can be adjusted over time to meet desired reductions or changes in emission reduction costs. In contrast, an ETS sets an emissions price by requiring permits for each unit of emissions, distributing permits based on a maximum emission cap, and allowing for the trading, banking, and borrowing of these permits.

Kazakhstan, the 14th largest CO₂ emitter globally, launched its Emissions Trading System in January 2013. The ETS, covering only CO₂ emissions from specific sectors, is designed for monitoring, reporting, verification, setting caps, and trading emissions. Based on 2013-2015 benchmarks, the ETS covered about half of emissions by 2019. Despite challenges that suspended cap allocation and trading from April 2016 to 2018, the system was revised and relaunched. As of 2021, low CO₂ prices (\$1.1/tCO₂) in Kazakhstan limit the incentive for decarbonization technologies.

The primary limitation of the ETS in Kazakhstan is the low carbon price, which does not adequately incentivize emission reductions. The initial design of the ETS, which focused on a narrow set of sectors and relied on historical emission benchmarks, also limited its effectiveness. Another critical issue is the lack of comprehensive coverage. By only targeting specific sectors, the ETS fails to address emissions from other significant sources. This partial approach limits the overall impact of the policy on national emissions and weakens the overall effectiveness of Kazakhstan's climate strategy. To address the shortcomings of the ETS, it is essential to implement a carbon tax alongside the ETS. A carbon tax sets a direct price on emissions, providing a clear and consistent economic signal to emitters. Unlike the ETS, a carbon tax can be adjusted over time to meet desired emission reductions and accommodate changes in the cost of reducing emissions. This flexibility makes it a powerful tool for driving long-term investments in low-carbon technologies and practices.

A carbon tax aims to internalize the external costs of carbon emissions by making fossil fuel consumption more expensive. Under a carbon tax, the government imposes a fee on each ton of greenhouse gas emissions, prompting businesses and consumers to reduce emissions by switching fuels or adopting new

technologies to avoid the tax. Unlike a cap-and-trade program, a carbon tax offers more certainty about costs but less about the exact level of emission reduction. Economic growth, driven by increased production capacity, raises CO₂ emissions, harming the environment and prompting regulatory measures like taxes and fines. However, these are often cheaper to pay than to reduce emissions, perpetuating the cycle. A corrective tax can address this by aligning private costs with social costs, compelling producers to account for environmental damage. The current equivalents are the carbon tax and the Carbon Border Adjustment Mechanism (CBAM), which targets imports with high carbon footprints and functions similarly to an emissions trading scheme. A EUR 10 per tonne CO₂ carbon tax is estimated to reduce emissions by 7.3% in a country starting with no carbon pricing, as each EUR 1 increase per tonne typically leads to a 0.73% reduction over time. Therefore, a carbon tax creates a financial disincentive for emitting carbon dioxide, encouraging both individuals and businesses to reduce their carbon footprints. In Central Asian states, this could lead to increased energy efficiency, adoption of cleaner energy sources, and a shift away from fossil fuels, ultimately reducing greenhouse gas emissions.

The combined implementation of ETS and carbon tax should not be limited to Kazakhstan. Currently, other CA countries contribute less to global emissions compared to Kazakhstan, but their collective emissions still represent a significant environmental impact. Kazakhstan is the largest emitter of GHGs in Central Asia, followed by Uzbekistan, while Kyrgyzstan, Tajikistan, and Turkmenistan contribute the least, with their combined emissions still lower than Uzbekistan's. The combined emissions from the five Central Asian countries total approximately 700 million tons annually, accounting for 1.5 percent of global emissions. Given this contribution to global GHG emissions, the implementation of a carbon pricing mechanism could play a crucial role in mitigating the region's environmental impact. As it has already been mentioned, by increasing the cost of carbon-intensive activities, a carbon price provides a financial incentive for businesses to reduce their carbon footprint. The funds generated from a carbon tax and ETS can be substantial. Central Asian states can utilize this revenue to invest in renewable energy projects, subsidize green technologies, and support communities transitioning from fossil fuel-dependent industries. This could accelerate the development of a low-carbon economy and create new job opportunities.

However, despite all the potential benefits of the carbon price, some challenges and disadvantages persist. Carbon pricing can lead to higher energy prices, which may disproportionately affect low-income households and increase the cost of living. In Central Asian states, where energy poverty is already an issue, this could exacerbate social inequality and provoke public resistance. Thus, this might lead to social and political opposition to this mechanism. Public support for carbon pricing relies on its distributional impact, meaning how different population segments are affected by the policy. Consequently, policies that directly raise fossil fuel prices can be contentious. This was evident in France in late 2018, when carbon tax increases on fuels sparked protests, and in Ecuador in late 2019, following government proposals to cut fossil fuel subsidies. This creates challenges, since the effectiveness of a carbon tax depends on its rate and the availability of viable low-carbon alternatives. If the price rate is too low, it may not provide a strong enough incentive for significant emission reductions.

Carbon pricing mechanisms have the potential to significantly reduce the climate burden of Central Asian states by incentivizing emission reductions, generating revenue for green investments, and promoting market efficiency. However, these benefits must be weighed against the economic impact, implementation challenges, carbon leakage risks, and political resistance. Kazakhstan's experience with its ETS demonstrates both the potential and difficulties of carbon pricing in the region. For carbon pricing to be effective in Central Asia, it must be carefully designed and implemented, taking into account the region's unique economic and institutional contexts. A combined approach of carbon taxes and ETS, tailored to local conditions, could offer a balanced strategy for achieving sustainable emission reductions and mitigating the adverse effects of climate change.

What Central Asia can Learn and Apply from EU Water legislation?

By Iulia Kuleshova

Societies have transformed over the last century, urban areas expanded, urban water consumption increased along with urban growth in inhabitants and needs for water have grown. Water is an indispensable condition of life, as well as a necessary resource for the implementation of economic activity. However, human actions pose a threat to water, reducing its availability in sufficient quantities and quality and creating the likelihood of water supply risks. According to the document “Convergence with the European Union's water policy”¹, the main threats are water pollution, due to agricultural drains, urban and industrial effluents, as well as excessive and unsustainable exploitation of water resources.

The European Union has positioned itself as a climate change forerunner from the early 1990s and claims to be a green leader in the introduction of new ecology wise technologies. This image has repeatedly been contested in the media and by members of non-governmental organizations², although, it is difficult not to evaluate the results achieved. Between 1990 and 2018, it reduced greenhouse gas emissions by 23%, while the economy grew by 61%³.

Having analyzed that current policies will only reduce greenhouse gas emissions by 60% by 2050, in December 2019 the European Commission published the European Green Deal (EGD), a new strategy in reaction to climate change, environmental dangers, and pollution. Authors of an article “Energy transition scenarios: What policies, societal attitudes, and technology developments will realize the EU Green Deal?” emphasize the importance of adopting this strategy, assuming that “the European Green Deal has been heralded as the “Europe’s man on the moon moment” as it aims to achieve 100% GHG reductions by 2050”.

The strategy also affects water policies through influencing changes in agriculture in the frame of revised “Common Agricultural Policy”⁴, in order to make sure that such sustainable practices are used, as precision agriculture, organic farming, agro-ecology, agro-forestry and stricter animal welfare standards. Farmers are also expected to perform greater control of nutrients for better water condition, cut emissions, handle and preserve carbon in the soil.

The mention of water protection measures can be found in different sections of the Green Deal, but generally there is a main law for water protection in Europe since 2000, Water Framework Directive (WFD) elaborated in order to protect and restore clean water in the EU.

Water Legislation in European Union

The EU Water Framework Directive creates a framework to safeguard the long-term sustainable use of the water in the EU. The directive is a legal infrastructure for defense of inland surface waters, transitional

¹ Convergence with the European Union's water policy Union. A short guide for partner countries in the European Neighborhood Policy, and Russia. Year?

² B. Kilian, O. Elgström (2010) “Still a green leader? The European Union's role in international climate negotiations”.

³ Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the regions. The European Green Deal year

⁴ Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the regions. The European Green Deal year

waters, coastal waters and groundwater. It also aims to prevent and reduce pollution, promote sustainable water use and mitigate the effects of floods and droughts.

The second fundamental part of Water Legislation is Marine Strategy Framework Directive (MSFD), founded with the objective of improving the maritime economy's long-term development and better conserving the aquatic ecosystem. To ensure that neighboring nations work together to manage the rivers and other bodies of water they share, it is based on a river basin district approach. By 2020 Member States had to develop ecosystem-based strategies for their marine waters, to be reviewed every six years. Besides that, there is a common regulation for all member States, defining the principles of sound coastal planning and management.

Two basic strategies are supplemented by more specific regulations: the Drinking Water Directive, the Groundwater Directive, Bathing Water Directive, Floods Directive, the Nitrates Directive, the Urban Waste Water Treatment Directive, the Environmental Quality Standards Directive and the Floods Directive and Marine Strategy Framework Directive.

In addition, the new EU biodiversity plan for 2030 was approved, calling for the creation of strictly protected areas for habitat restoration and fish stock recovery as well as the expansion of protected areas.

Supplementary EU initiated the creation of the European Maritime Safety Agency, which is in charge of prevention of pollution caused by ships and by oil and gas installations. The Agency is obliged to make sure that polluting actors are subject to effective administrative or criminal consequences.

And finally another important elements of water resources protection are international cooperation frameworks. Four conventions, regulating the protection of marine waters in Europe are Regional Sea Conventions between Member States and Neighboring Countries Sharing Common Waters; the OSPAR Convention of 1992 for the North-East Atlantic; the Helsinki Convention (HELCOM) of 1992 on the Baltic Sea Area; the Barcelona Convention (UNEP-MAP) of 1995 for the Mediterranean; and the Bucharest Convening of 1997. Several International treaties also provide protection for EU river waters: the 1996 Danube River Protection Convention, the 1999 Convention on the Protection of the Oder against Pollution, and the 1999 Convention for the Protection of the Rhine.

Effectiveness of water policies in EU

A 2019 evaluation⁵ of the WFD came to the conclusion that although its implementation has to be sped up, it is generally fit for purpose. In June 2020 it was declared that the WFD would not be altered and that its implementation and enforcement would take precedence.

In June 2020, the Commission approved a report on the first cycle of the Marine Strategy Framework Directive's implementation. *Some figures and tables would be good here* Virginijus Sinkevičius, EU Commissioner for Environment, Oceans and Fisheries, concluded: "Our water legislation is strong and able to protect both water quality and quantity, also in view of the new challenges from climate change and emerging pollutants, such as microplastics and pharmaceuticals. But more than half of all European water bodies are not yet in good status, and the challenges for Member States are

⁵ Evaluation of EU water legislation concludes that it is broadly fit for purpose but implementation needs to speed up (europa.eu)

more than substantial. We now need to accelerate the implementation of what we have agreed. The momentum of the European Green Deal will allow us to make such a leap forward."

Green policies in Central Asia

Scholars Sabyrbekov, Overland and Vakulchuk in their work "Introduction to Climate Change in Central Asia" point out that the Intergovernmental Panel on Climate Change has been concerned about Central Asia's understudied status for climate change since the 2010s, despite the region's sensitivity to its effects (referenced needed).

The urgency of teaching Central Asian cultures how to adapt to the effects of climate change is emphasized by Fabienne Bossuyt⁶. She considers a need to share responsibilities between people and communities in order to strengthen these countries' capacity to endure the effects of climate change. The researcher specifies that local solidarity movements have a long history in Central Asian countries and can be a driving force, necessarily supported by Central Asian governments and international funders.

Situation with water in Central Asia

The World Resources Institute created a map in 2016 titled Water Stress by Country that examines the global freshwater limitations suffered by various nations. This map makes it evident that Central Asia, together with Mongolia, Afghanistan, Iran, Pakistan, and the Arabian Peninsula, is part of the Mongolian-Arabian belt of severe water stress⁷.

Thomas Bernauer in the paper "Climate change and international water conflict in Central Asia" states that "existing research shows that one of the most important social and political risks associated with climate change pertains to water availability" (reference). Additionally, the researcher mentions that transnational water systems located in poor and politically unstable areas of the world carry the greatest risk of international conflicts or militarized interstate violence.

Scholars Sabyrbekov, Overland and Vakulchuk express a similar opinion: "Inefficient water resource management at the national level and limited regional collaboration on the management of water resources, coupled with state capacities that remain insufficient to tackle climate change impacts, compound water-related tensions between the countries in the region".⁸

Daloz believes that Central Asia may experience significant water shortages in the absence of sufficient adaptation measures, which would be damaging to the region's energy and food security⁹.

Bernauer describes two main sources of water of the Central Asia region, the Amudarya and Syrdarya, and warns that forecasts indicate that the river discharge in the Amu Darya river basin will be 30 percent lower than the average annual runoff over the previous 10 years as a result of the anticipated melting of mountain glaciers. As a result, there will be more flooding in the spring and more droughts in the summer due to drastically reduced water supply in the summer. The researcher claims that this tendency will have

⁶ Fabienne Bossuyt "The Importance of Boosting Societal Resilience in the Fight Against Climate Change in Central Asia"

⁷ A.Ilhaimov, High and dry: Central Asia's failure to avert the impending water crisis

⁸ Sabyrbekov, Overland and Vakulchuk "Introduction to Climate Change in Central Asia"

⁹ A.Daloz 'Climate Change: A Growing Threat for Central Asia'

a particularly negative impact on agriculture, which dominates the economies of Turkmenistan, southern Kazakhstan, and Uzbekistan.

Between a set of potential problems, connected to water, he describes fresh water deficit, a scarcity of irrigation water for agriculture, Amudarya and Syrdarya's contamination by irrigation runoff's high pesticide content. Bernauer complains that he observes no preparation and even no awareness about future water crises.

However, situations of countries of this region widely vary depending on their geographical location. Ilhaimov describes that the region is divided into two types of nations: those in the upper reaches of the region's major rivers, who do not experience a water shortage (Kyrgyzstan and Tajikistan) and those in the lower reaches of these rivers (Kazakhstan, Turkmenistan and Uzbekistan). He provides data: Kyrgyzstan and Tajikistan together account for 85 percent of the annual circulation of water in rivers and reservoirs in the Aral Sea basin, leaving only 15 percent of the other three countries.

Research question

This work is devoted to the brief analysis of what ideas of EU Water Legislation are applicable in Central Asia in order to minimize future human water shortages and undesirable environmental impacts.

So in the next section, I'll list the ideas that arose after familiarization with the Water legislation of the European Union.

EU concepts, useful for Central Asia

1. It seems that the first global and most important step is the development of comprehensive water legislation in each country of Central Asia. Firstly, it should include a clearly regulated management of river water resources, because the territory of the region occupies a vast drainless area within the closed Aral-Caspian basin, and this feature determines a special regime that is extremely susceptible¹⁰ to the effects of economic activity and climate change.
2. According to 2016 data, the issues of water allocation and water distribution were resolved on the basis of interstate agreements developed back in the Soviet period¹¹. In that case there is a need to assess the potential of water resources for the revision of previously concluded agreements.
3. It is urgently necessary to increase the volume of relevant research in the field of water resources management so that decision-making bodies have a complete picture of the prospects and threats
4. It is necessary not only to promote the reduction of the use of freshwater, but also, as EU strategies prescribe, strictly regulate the use and the pollution within a given framework both in industry, in agriculture, and in households.
5. As EU does, it is important to adopt common regulations for the entire region, since different countries share common water resources.
6. Developing urbanization could reduce the scale of water usage in regional households.

¹⁰ Project Report "The Aral Sea and Central Asian countries in the context of climate change in the 21st century"

¹¹ Umarova M.(2016) "The state of use of land and water resources of the Kyrgyz Republic"

Referring to the resources for a change that already exist, I can quote Ilkhamov who assumes there is no shortage of financial and intellectual resources to solve the problem as a lot of international organizations have been established in the region in the past few decades to combat water scarcity (reference). He brings examples of the International Fund for Saving the Aral Sea, the Interstate Coordination Water Commission of Central Asia, the Research and Information Centre, getting financial and technical assistance from Swiss, German, and American international development agencies, the United Nations Development Programme, the World Bank, the Asian Development Bank, and the European Union.

However, a list of challenges for implementing some EU practices is impressive

1. Ilkhamov points out that international initiatives in Central Asia have low efficiency, giving an example of these, supposed to prevent the depletion of the Aral Sea (reference).
2. For a moment not only Local citizens, but also regional officials appear to be unprepared to handle the situation and avert an impending water crisis.
3. Conflicts between the countries of the region hinder the development of a common water regulation. Ilkhamov states there is profound mutual mistrust between local neighbors and gives an illustration, presuming that Uzbekistan worries that proposals by its neighbors to build big hydroelectric power facilities could sabotage its water supply by altering the water flow in significant tributaries of the Amudarya and Syrdarya. In retaliation, Uzbekistan has threatened to stop supplying gas to Kyrgyzstan and Tajikistan (reference).
4. Ilkhamov states that urbanization can not help in this problem, as it would require a creation of way more jobs in industry and services. The scholar also complains at Uzbekistan and Turkmenistan's economic policies which do not encourage the development of a service-based economy. In opposite both nations continue to maintain elements of a command economy, which, along with high levels of corruption, hampers the growth of businesses.

Conclusion

I believe that the creation of working institutions is a necessary key for the complicated array of national and local policies that deal with the issue of water resource conservation and wise use. Local communities are certainly a great help, but If the creation of institutions fails at the national level, it is unlikely that effective institutions will emerge on a regional scale.

Despite their best efforts to support Central Asian countries in resolving these difficulties, donors cannot act in these governments' place and carry out the responsibilities that these governments are accountable for carrying out on their own.

Energy Security and Sustainability in Central Asia: Can a Carbon Tax Help?

By Tolgonai Alaibekova

Introduction

Central Asia faces a significant challenge: balancing its heavy reliance on fossil fuels with environmental sustainability and energy security. Currently, 95% of the region's energy supply comes from fossil fuels like natural gas, oil, and coal (UNECE 2023). This reliance hinders development of abundant renewable energy sources like solar, wind, and hydropower (UNECE 2023; Craig Turp-Balazs 2024; Charles Cormier et al. 2024). Transitioning to a cleaner energy mix is essential for both environmental and economic reasons, as it reduces reliance on volatile global markets and promotes long-term sustainability. A carbon tax, a policy tool that places a price on carbon dioxide emissions, has emerged as a potential solution to promote cleaner energy and reduce reliance on traditional fuels (Parry 2024). This paper examines the potential impact of a carbon tax on energy security in Central Asia, a region heavily reliant on fossil fuel production and exports.

Energy security challenges in Central Asia

After gaining independence in the early 1990s, Central Asian countries—Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan—inherited a fragmented energy infrastructure primarily designed for Soviet-era needs. This legacy has resulted in a reliance on hydrocarbons, with significant reserves of oil, gas, and coal concentrated in Kazakhstan and Turkmenistan, while Kyrgyzstan and Tajikistan relied heavily on hydropower due to their mountainous terrain (Egan 2007). While Central Asia's energy landscape was shaped by its Soviet past, the region now faces a new set of challenges that threaten its energy security.

In recent years, the region has faced escalating energy crises, particularly highlighted during the winter of 2022-2023 (Ozat 2023). In addition to it, Central Asia's energy demand is projected to grow by over 30% by 2030, driven by economic and population growth in the region (Asian Development Bank 2023). However, the region remains heavily reliant on fossil fuels, with natural gas and coal dominating the energy mix (UNECE 2023). This energy-intensive economy contributes significantly to the region's carbon emissions, which countries are now aiming to reduce through commitments under the Paris Agreement (Parry 2024). This overdependence on fossil fuels has far-reaching implications for the region's energy security, economic stability, and environmental sustainability.

Several challenges exacerbate this situation such as aging infrastructure, need for regional cooperation, and climate change threats. Aging and inefficient energy infrastructure is considered one of the main challenges. The energy supply sector, burdened by a significant historical legacy and minimal change over the past fifty years, is now rapidly becoming outdated and underfunded (Sabyrbekov et al. 2023). Transmission and distribution losses reach up to 20% in some countries, and modernizing this infrastructure requires substantial investment (Asian Development Bank 2023). In addition, regional cooperation is crucial as countries are interconnected through the Central Asian Power System, but grid stability requires better coordination (UNECE 2023). Furthermore, climate change further threatens energy security. Rising temperatures and erratic precipitation patterns impact water resources vital for hydropower generation, a crucial clean energy source in the region.

Despite these challenges, positive steps are being taken, although not always effectively. All five Central Asian countries submitted Nationally Determined Contributions (NDCs) under the Paris Agreement, outlining their commitment to reducing greenhouse gas emissions (Adylbekova 2023). However, present

trends and national policies in four CA countries-Kazakhstan, Kyrgyzstan, Uzbekistan, and Tajikistan-indicate that significant shifts in energy transition and greenhouse gas emission reduction are unlikely to happen in the near future (Sabyrbekov et al. 2023). Therefore, given the complex energy security challenges facing Central Asia, a carbon tax emerges as a potential policy instrument to address these issues.

The potential impacts of a carbon tax

The introduction of a carbon tax in Central Asia could significantly impact the region's energy security. One of the most significant ways a carbon tax can enhance energy security is by incentivizing a shift towards renewable energy sources. Carbon tax would incentivize a shift away from fossil fuels towards renewable energy sources like solar, wind, and hydropower, which Central Asia has significant potential for (Asian Development Bank 2023). This would reduce the region's reliance on imported fossil fuels and make the energy supply less vulnerable to price volatility and supply disruptions (OSCE 2022).

Second, carbon tax would encourage investments in energy efficiency measures across sectors, helping to reduce energy demand and improve the reliability of energy supply (Asian Development Bank 2023). Modernizing aging energy infrastructure and transmission networks could significantly improve energy efficiency and reduce losses, enhancing overall energy security (Asian Development Bank 2023). Rising energy costs incentivize businesses and households to adopt energy-efficient practices and technologies, further enhancing security.

Third, a coordinated carbon pricing approach across Central Asia could incentivize greater regional cooperation on cross-border energy infrastructure and power trading (Abdi et al., 2023). This could optimize the use of the region's diverse energy resources and improve the reliability and resilience of the interconnected power system (Asian Development Bank 2023). Regional cooperation on carbon pricing could also lead to knowledge sharing and capacity building in the clean energy sector.

While the potential benefits of a carbon tax on energy security in Central Asia are substantial, several challenges and considerations must be addressed for successful implementation.

Challenges and considerations

As carbon tax is recognized as an effective tool for mitigating climate change, its implementation can be politically challenging due to concerns about its regressive nature, particularly in economies reliant on carbon-intensive energy sources. A major hurdle to implementing a carbon tax is its potential regressive impact on certain segments of the population. The introduction of a carbon tax could provoke political challenges, as governments must balance environmental goals with economic stability and public acceptance. Effective compensation schemes will be essential to protect vulnerable households and promote public support for carbon tax implementation (Alonso and Kilpatrick 2022). In addition, fossil fuel subsidies are still prevalent, which would need to be gradually phased out to make a carbon tax effective (Azour et al. 2022). This requires careful planning to manage potential social and economic impacts.

Another challenge concerns financing the transition to clean energy and upgrading energy infrastructure would require significant public and private investments (Asian Development Bank, 2023). Innovative financing mechanisms and international cooperation can bridge the gap. In addition, there are concerns about the potential short-term economic impacts, particularly on vulnerable populations and energy-intensive industries (Azour et al. 2022).

Furthermore, while a carbon tax could foster regional cooperation among Central Asian states, the region remains politically and economically unintegrated, which may hinder collective action to address shared energy challenges and resource management issues (Sabyrbekov et al. 2023).

Addressing these challenges will require a comprehensive approach that balances environmental goals with social and economic considerations. To maximize the benefits and minimize the drawbacks of a carbon tax, policymakers in Central Asia must carefully consider these challenges and implement appropriate mitigation strategies.

Conclusion

This paper explores the potential of a carbon tax as a promising policy instrument to lead the Central Asian region towards a cleaner and more resilient energy future. By incentivizing a shift towards renewable energy sources, enhancing energy efficiency, and fostering regional cooperation, a well-designed carbon tax can significantly contribute to strengthening energy security in Central Asia. However, the successful implementation of a carbon tax requires careful consideration of several factors, including potential regressive impacts, the need to phase out fossil fuel subsidies, substantial investment requirements for clean energy infrastructure, and the region's limited political and economic integration. To overcome these challenges, policymakers must adopt a comprehensive approach that balances environmental goals with social and economic considerations.

While the challenges are substantial, the opportunities for Central Asia are equally significant. The region possesses abundant renewable energy resources, and a well-designed carbon tax can unlock their potential. By carefully considering the region's unique circumstances and implementing appropriate mitigation measures, Central Asia can harness the potential of a carbon tax to build a more secure, sustainable, and prosperous energy future.

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Barriers in legislative framework of Renewable Energy in Kazakhstan

By Dilnaz Kabysheva

Kazakhstan has an ambitious goal of developing the share of Renewable energy by 50% in 2050. While at first glance this seems hardly achievable for a resourced-cursed country like Kazakhstan, so far the state has already been ahead of its plan. Current milestone was to achieve 6% share by 2025, but the major CA state has already passed through that checkpoint in 2024. This section will provide information with current and historical background of RE development. It should be mentioned that there is a lack of studies in regard to constraints and barriers in that area, therefore, this research would be a good fit as a contribution to fill that gap.

As the first step, the law on supporting Renewable Energy development was adopted in 2009. Based on that law, Kazakhstan attempted to create a legislative and institutional framework for attracting investments in that field. However, the initial law was not sufficient enough and the development of RE, therefore, was slow. As a result, by 2018, the share of RE in the country was about or even less than 1%. Despite the fact that it might have seemed like a failure at first glance, the establishment of the law was a huge breakthrough for a country that is much reliant on oil and coal. According to the work of Nikolai Mouraviev, this law can rather be seen as an initial attempt rather than an excessive framework of institutionalization. It should have been perceived as a work in progress and something to be improved with time. However, because of that it was unable to create favorable conditions for the investors. Lack of clear guidance for the investors, high risk due to *ex post* changes in policy and support conditions, and the governance's inability to guarantee with "regulatory stability" made the business climate harsh for investors. In this context the term regulatory stability can be defined as fair and equitable standards from the governmental side and respect for investors' reasonable and legitimate expectations. Hardships in the business climate are one constraint that hinders the development of RE.

Business climate is one of the most important parts of renewable energy development in Kazakhstan, because, according to Shadrina, 97% of the RE power plants are private. Kazakh government, at first, presented subsidies to the RE area through feed-in tariffs (FiT). The goal of FiT is to compensate for investors' potential losses due to various reasons by setting a fixed price for energy. By financial ensuring of the investors, the business climate became more welcoming. However, later on, it became harder to maintain because FiT policy kept the quantity of the projects undetermined. Therefore, another tool, - auctions, - was introduced by the government. The main purpose of auctions is to choose the project with the lowest price and, therefore, limit quantity as well. In other words, auctions enabled a volume control mechanism. Otherwise, it might have led to excessive pressure on the network in places characterized by good RE resources.

Lack of clear guidance and an abundance of confusing bureaucracy were also problems for many investors that had led to many of them giving up. That was one of the reasons why RE had been developing slowly in the beginning. However, as a response, a few changes were made to make the process easier.

To address the first need, the guidance for investors was created in 2015 for the first time by the International Finance Corporation (IFC), and then, 5 years later in 2020, a more detailed and clear version of it, in cooperation with USAID, was published. These guidelines helped to understand the details and make the process much easier for the investors. Confusing bureaucracy stayed as the barrier though. This opened room for corruption and made the investments less attractive than it could have been. The overloaded bureaucracy prolongs the process. Investors "are reluctant ... because rules are complicated", as one interviewees pointed out. "Instead of [written] 45 days, the approval took 6 months" says the other one.

Regulatory stability is a term that means conditions and guarantees for investors that align with their reasonable and legitimate expectations. Sudden, unpredictable changes of policy that might lead investors to unfavorable conditions and make them vulnerable financially make Kazakhstan's business environment less credible. In addition, there is a paradox here that should be mentioned because of its importance for business climate. Electricity tariffs in Kazakhstan are low because cheap domestic fossil fuels are available. However, subsidies from the government to support RE development require financial resources, which leads to increasing prices for electricity. In other words, low tariffs in that case hinder RE development. On the other hand, fixed prices for RE due to FiT can cause regulatory instability. Therefore, the main challenge here is to balance low-electricity costs with the need to finance RE projects and create a regulatory environment. It should be mentioned though, that there are programs such as "De-risking Renewable Energy Investment" co-funded by UNDP and Global Environment Facility(GEF) that shows other active players that are also driving the transition to cleaner energy forward.

In conclusion, Kazakhstan stands at a critical juncture in its energy trajectory, slowly but steadily shifting away from heavy reliance on fossil fuels towards a more diversified and sustainable energy landscape. The government of Kazakhstan has shown its active role in creating an investor-friendly business climate and conditions got clearer and better over time.

Despite significant progress, numerous barriers hinder the development of renewable energy (RE) in the country.

One dimension of it that can be paid attention to is governance of Renewable Energy. There is a Finance Settlement Center which was established as the intermediary responsible for centralized purchase of RE and selling it to Thermal Power Plants. However, this intermediary does not have other income sources beside payment from TPP and, officially, it is not required to have financial reserves more than USD 600. Therefore, there is high risk for investors to not get paid, which makes them hesitant to invest in the first place.

The government's ambitious goals to increase the share of RE demonstrate a clear commitment to addressing environmental concerns and ensuring future energy security. However, challenges such as investment-related barriers, regulatory instability, and outdated infrastructure are significant obstacles that hinder realizing these objectives.

Investment-related barriers, including unclear guidance for investors and bureaucratic complexities, have stopped potential stakeholders from engaging in RE projects. While efforts to make the process easier and provide clearer guidance have been made, bureaucratic hurdles persist, impacting the attractiveness of investments.

Regulatory instability, along with fluctuating energy prices and conflicting policy objectives, further complicates the business climate for RE development. Balancing the need for affordable electricity with the imperative to finance RE projects remains a key challenge that is being faced by the government. Last but not least is the problem in the dimension of RE governance, specifically mistrust to the Financial Settlement Center. In navigating these challenges, Kazakhstan must adopt a multifaceted approach that addresses investment-related barriers, enhances regulatory stability, fosters social acceptance, and invests in modernizing its infrastructure. It has already taken steps in that direction.

Collaboration with international partners and leveraging innovative financing mechanisms can also facilitate progress towards achieving the country's ambitious RE goals.

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Gendered Climate Challenges: Insights from Kyrgyzstan

By Shirin Kimsanova

Abstract

The essay discusses the intersection of climate change and gender equality in Kyrgyzstan by highlighting the disproportionate impact of environmental challenges on women. It explores how patriarchal norms and limited access to resources exacerbate these disparities, particularly in the agricultural sector in country. Additionally, this paper highlights the importance of adopting gender-responsive strategies to address climate threats effectively and promote sustainable development.

Kyrgyzstan like many other countries in Central Asia faces significant climate change challenges due to its mountainous terrain. Climate studies by Rahat Sabyrbekov, Indra Overland, and Roman Vakulchuk stated that there was a 1.2°C temperature rise between 1960 and 2010 indicated, with projections for a further 5.3°C increase by the 2050s in Kyrgyzstan. It is emphasized that this warming, in turn, can lead to further melting of glaciers, frequent floods, and landslides caused by heavier rains. Moreover, the Central Asian region is considered predisposed to droughts, which, in turn, raise worries among local people.

Climate change disproportionately affects women in developing countries like Kyrgyzstan, particularly those in marginalized communities. Given the deeply entrenched patriarchal structures of the region, Kyrgyzstan faces challenges in achieving gender equality, particularly when addressing global climate threats. Indeed, the increased vulnerability of women to climate-induced disasters is indicated in the “Climate Change and Coastal Ecosystems Programme”. Limited mobility, lack of access to crucial information, and cultural norms prioritizing male survival during disasters contribute to higher female mortality rates. Therefore, it is obvious to assume that a gendered approach is certainly essential to comprehensively address climate change and its consequences in Kyrgyzstan. Moreover, to overcome these challenges, further research and data collection specific to Kyrgyzstan's context and approaches to gender are necessary. This data will be crucial for designing and implementing gender-inclusive climate change strategies that dismantle existing barriers.

The unequal impact of climate change is also exacerbated by the fact that women, globally, have limited access to land, water, and other natural resources critical for their livelihoods, and Kyrgyzstan is not an exception. “Engendering Climate Change: Learnings from South Asia” proves that statement and suggests that restricted opportunities exist for women's participation in climate adaptation efforts due to limited land rights, restricted access to resources, minimal involvement in decision-making processes, and missed educational opportunities.

Moreover, climate change intensifies gender inequalities, which has great impact on the sector of agriculture in Kyrgyzstan, as gender inequality leads to decreased agricultural productivity, loss of income, and increased food insecurity for women and their families. As stated by USAID, agriculture serves as the foundation of the rural economy in the Kyrgyz Republic, engaging approximately 40% of the workforce and contributing to 20% of the gross domestic product. Consequently, women playing a significant role in agricultural production influence the country's entire economy. The Food and Agriculture Organization (FAO) emphasizes that climate change disrupts traditional farming practices, impacting crop yields and livestock health, and jeopardizing food security. In this case, women farmers face additional challenges due to limited access to credit, extension services, and technology.

Considering the example of Kyrgyzstan, where women frequently manage farms while men migrate for work, it is obvious how disproportionately climate change affect women's well-being (see Table 1). The “Climate Change in Central Asia”, for instance, highlights the case in Yssyk-Kul, the eastern Kyrgyzstan,

where apricot farming provides crucial income for women engaged in agriculture there. However, a heatwave in 2015 caused early ripening, which led to apricot spoilage, resulting in significant financial and social losses for women. This incident underscores the vulnerability of rural farmers, particularly women, to climate change's effects on livelihoods.

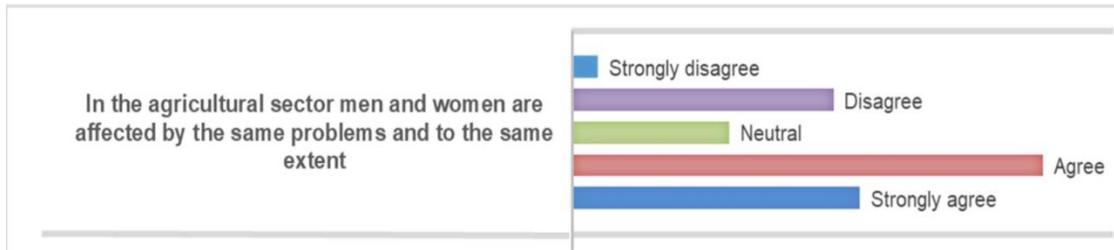


Table 1.

How men and women are affected in the key sectors.

As evidenced in the poll below (Table 2), combating climate change necessitates the development of gender-responsive strategies. Effective solutions require adopting policies and interventions that empower women, promote gender equality, and build resilience in vulnerable communities. Encouraging women's participation in decision-making processes at all levels of governance is critical. The United Nations Development Programme (UNDP) emphasizes that targeted capacity-building initiatives, inclusive policy frameworks, and creating spaces for women's voices to be heard can achieve this.

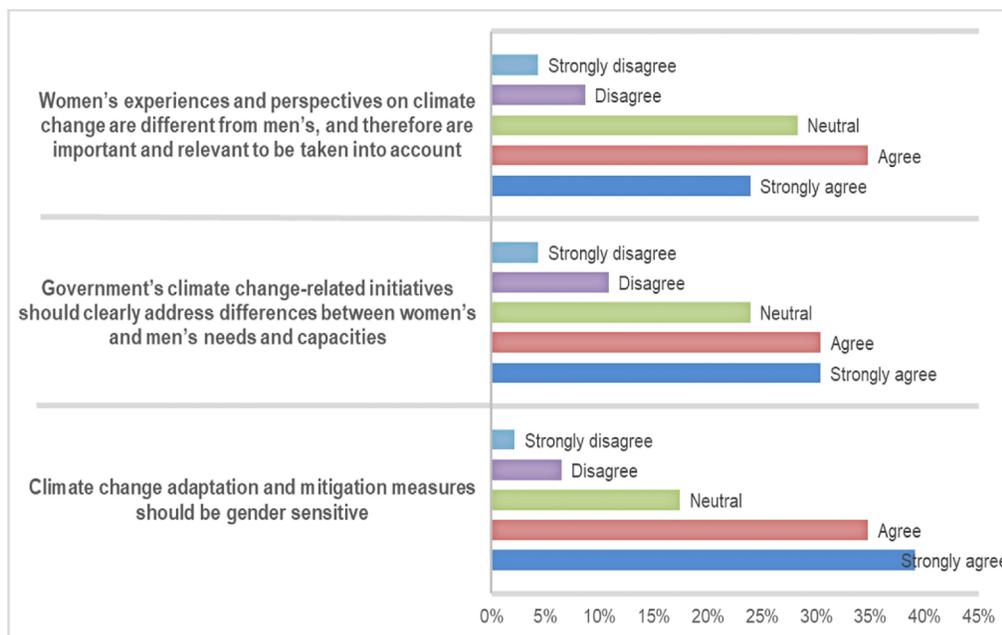


Table 2. Inclusion of women's and men's differences.

In planning and creating strategies aimed at improving women's roles in addressing climate threats, it is crucial first of all to empower women in a multifaceted manner. As the UNDP highlights, investing in women-led enterprises, promoting sustainable livelihood options, and strengthening social safety nets can contribute to poverty reduction and community resilience. Access to credit, markets, and technology can further significantly enhance women's ability to adapt to climate change impacts. Additionally, distinct importance should be given to building climate-resilient infrastructure, improving access to clean water and sanitation, and strengthening disaster preparedness measures, as advocated by "Gender and Climate Change Supporting Resources Collection".

In conclusion, Kyrgyzstan's example, especially in agriculture, highlights a small part of the global climate change challenge impacting women. To tackle such issues effectively, we need global solutions. Unfortunately, Central Asia, including Kyrgyzstan, struggles to implement strategies de facto, despite initiating them de jure. However, having these strategies is crucial. Examining Kyrgyzstan's case emphasizes the need for tailored approaches. A gendered approach is vital for sustainable development, empowering women and promoting equality for a fair and resilient future in Kyrgyzstan.

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List of Illustrations

Table 1. Kovaleva, Marina, et al. “How men and women are affected in the key sectors”. “Central Asia: Exploring Insights on Gender Considerations in Climate Change.” Sustainability. MDPA. Accessed July 7, 2024. <https://www.mdpi.com/2071-1050/15/16/12667>

Table 2. Kovaleva, Marina, et al. “Inclusion of women’s and men’s differences.” “Central Asia: Exploring Insights on Gender Considerations in Climate Change.” Sustainability. MDPA. Accessed July 7, 2024. <https://www.mdpi.com/2071-1050/15/16/12667>

Recycling in Kazakhstan: Challenges and Opportunities

By Baurzhan Kuanyshv

Introduction.

Recycling is essential for advancing sustainable development and minimizing negative environmental effects. Kazakhstan is struggling with the difficulties of waste management as the world faces rising garbage generation and resource depletion. Although the issue is pertinent, it is a hot topic in Kazakhstani society, and there are pertinent academic studies in the field, it's important to consider the issue from all angles and analyze the industry's development prospects while taking into account the views of officials and experts. The current situation of recycling in Kazakhstan is examined in this essay, along with its difficulties and potential for growth. We can learn how Kazakhstan can improve its recycling efforts by studying governmental activities, public participation, and viable solutions.

Research question.

"What are Kazakhstan's recycling potential and problems currently, and how can the country improve its recycling initiatives to support environmentally friendly waste management?"

Main body.

According to the 2022 Environmental Performance Index, provided by the Yale Center for Environmental Law & Policy, Kazakhstan ranked 93 out of 180 countries, and regarding waste recycling – 175 line out of 180. Examining Kazakhstan's total waste management problem is crucial to comprehending the context of recycling within the nation. With its expanding population and industry, Kazakhstan confronts a considerable issue in terms of waste management. The nation produces a sizable amount of waste each year, with projections predicting an increase in waste creation as a result of urbanization and population expansion, according to forecasts, by 2025 Kazakhstan will produce 8 million tons of waste annually. The infrastructure for waste management is currently under strain as a result of the surge in trash creation and shifting consumption habits. Kazakhstan's MSW varies in composition according on area and degree of urbanization. Organic trash, paper and cardboard, plastics, glass, metals, and building debris are typical components. As it affects the viability of recycling, composting, and other waste treatment processes, understanding the composition of MSW is essential for creating efficient waste management strategies. The handling and disposal of trash effectively in Kazakhstan is hampered by a number of issues with waste management procedures. Subpar waste management outcomes are a result of ineffective trash collection methods, insufficient waste segregation, and a lack of sorting and processing facilities. Risks to the environment and public health are greatly increased by improper waste management techniques. Untreated landfill leachate and improper garbage disposal contaminate soil, groundwater, and surface water bodies, causing pollution and possible health risks. The open burning of waste results in the discharge of hazardous gases and particulates, which adds to air pollution. It is essential to comprehend these effects in order to emphasize how urgently waste management procedures in Kazakhstan need to be improved. The main challenges and constraints in waste management in Kazakhstan are inadequate infrastructure, a lack of finance, a lack of widespread public participation, and a lack of strict waste management laws and regulations. These difficulties are made worse by the lack of a comprehensive waste management system and the inadequate cooperation amongst key parties. The situation is aggravated by corruption, as well as the involvement of criminal structures in this area.

Government initiatives and policies play a crucial role in shaping and promoting recycling practices and sustainable waste management. The Concept of transition of the Republic of Kazakhstan to "green

economy” identified one of the primary areas of focus as improving the management of municipal solid waste (MSW). This concept was approved by Presidential Decree No. 577 on May 30, 2013. The Concept set ambitious goals to ensure the recycling of 40% of waste by 2030, and 50% of waste by 2050. The Republic of Kazakhstan collected and processed 25.4% of the world's MSW in 2022. Approximately the same dynamics, between 3% and 4%, are anticipated from the implementation of environmental programs in the area of MSW processing by experts from the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan over the course of the following 2.5 years, according to data from the national project "Green Kazakhstan". By the end of this year, if all the scheduled plans are carried out, the level of trash sorting and processing should be 27%, industrial waste should be 42%, and by the end of 2025, it should be 34% and 46%, respectively.

The major legislative act regulating recycling is the Ecological Code of the Republic of Kazakhstan. The new Code introduced a new term waste management, and also defined the rules and conditions for waste management. Although Kazakhstan's waste management legislation complies with international standards, it is not supported by adequate or modern infrastructure.

It should be noted that there is some experience in the field of waste processing. In 2007, a waste processing plant was launched in Almaty, but in 2010 the plant was closed. In 2012, a waste processing plant was launched in Astana, but it is only 30% loaded. The main problem in the work of the plants was the lack of adequate funding from the state, which can be described as a lack of proper political will. In parallel, Kazakhstan started implementing a novel method for processing municipal solid garbage in 2020 known as waste to energy. According to this theory, garbage is burned to produce energy that can be used for a variety of purposes. Six plants are expected to be constructed. Almaty, Astana, Aktobe, Shymkent, and Ust-Kamenogorsk should all get factories developed. By 2025, all businesses should be up and running.

It was mentioned in the “Central Asia Waste Management Outlook”, that Kazakhstan is the only country in the region that has introduced extended producer responsibility (EPR) and the EPR national operator. The company “ROP Operator” LLP (EPR national operator) was created in 2016 with the mission of organizing garbage collection, transportation, processing, and disposal. Some sources claim that Aliya, the youngest daughter of Nursultan Nazarbayev, the first president of Kazakhstan, was the organization's inaugural founder. It was revealed at the start of last year that the ROP Operator, who was responsible for collecting the recycling charge from manufacturers and importers, had ceased operations. ROP was a monopolist that has the right to set the amount of the recycling fee at its own discretion. At the same time, ROP did not bear any responsibility either to product manufacturers or to society. The state acquired ownership of the assets produced at the cost of the recycling charge. The administrator's duties were given to the state-owned business Zhasyl Damu, which was chosen to operate the ROP. Therefore, although Kazakhstan has taken significant steps in the field of waste recycling, corruption and disinterest in specific results has led to the fact that Kazakhstan has not yet achieved any significant results in this area to date.

There are two non-governmental organizations in Kazakhstan that deal with recycling issues: Self-regulatory organization “Kazakhstan Association for Waste Management “KazWaste” which was established in 2013 and unite 33 companies and Association of Converters of Secondary Raw Materials of Kazakhstan which was established recently this year. KazWaste has established itself as a reputable organization that, among other things, certifies waste management activities. To date, KazWaste has issued 11 such certificates. The Association of Converters of Secondary Raw Materials of Kazakhstan has not yet taken any significant steps, but we believe it will contribute to the development of the recycling industry. In general, both organizations set themselves similar goals aimed at improving the situation in the field of waste management, strengthening public-private partnerships in this area, improving the regulatory framework and improving industry financing.

Conclusion.

Recycling has a lot of potential for tackling Kazakhstan's waste management issues and fostering a more sustainable future. But a number of barriers prevent it from progressing. This essay has emphasized the need for better recycling infrastructure, more government regulations and enforcement, greater public involvement, and the investigation of cutting-edge technology. Kazakhstan can alter its recycling culture and establish a circular economy that reduces waste and improves resource efficiency by adopting a comprehensive and cooperative strategy. Recycling is advantageous for the environment, but it also creates job opportunities, lessens the need for landfills, and raises the nation's sustainability ranking. To overcome the obstacles and take advantage of the potential presented by recycling in Kazakhstan, it is imperative that all parties involved—the government, industry, civil society, and citizens—work together.

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Comparing Energy Policies of Tajikistan and the European Union: Lessons for Tajikistan

By Ramziya Mirbozkhonova

Climate change has become one of the main considerations of the governments in their policymaking due to the significance of its impact on all spheres of the lives of the population. Therefore, around the world, states have started managing their carbon emission through various instruments and are trying to use renewable energy instead of fossil fuels. There are international, regional and national level measures and targets to move towards decarbonization and reducing emissions. One of the biggest spheres which is under the focus of the global community in relation to climate policies is energy sector, which plays a considerable role in different aspects of people's livelihoods and consequently is harder to be made climate friendly. Thus, in different parts of the world there are various levels of success in moving towards greenness. One of the regions which has a leading position in decarbonization is Europe due to the EU climate policies, which have been implemented throughout its member states. In other developing countries like Tajikistan, reducing emissions and producing energy efficiently is an important goal as well, while there are bigger challenges in the way of achieving the targets. However, with the existence of energy sources in Tajikistan, there is potential for success in increasing the use of renewable energy in the country. This paper explores the energy policies of Tajikistan in comparison with the European Union to present the current status of implementation and to identify the lessons that Tajikistan can learn from the practices of the EU.

Overview of Energy Sector of Tajikistan

Tajikistan has an abundance of renewable energy resources and the main source of its electricity is hydro power due to having rivers, lakes and glaciers in its territory. In terms of hydropower potential, Tajikistan is ranked eighth in the world with the estimate of 527 TWh, whereas the exploited proportion of this potential is only 4% currently. It has a number of big hydropower plants, which produce electricity and the construction of some of them dates back to the Soviet Union. However, the produced energy does not suffice all areas of energy consumption and fossil fuels are still widely consumed for heating and transportation. The rural areas of the country where the majority of the population dwell, are prone to electricity shortages in the colder seasons. This year, even the capital city experienced electricity outages due to the malfunction in Nurek Hydroelectric Power Plant (HPP). According to International Energy Agency, the primary source of energy in Tajikistan is hydropower, which is followed by imported oil, gas and coal. Because of seasonal lack, the energy sector in the country is at risk of supply shocks. The total energy supply of the country comprises of 41.4% hydro, 28.4% oil, 25% coal and 5.2% natural gas. The main priorities in this sector in the national level are energy security and diversification of the energy sources from HPP, which account for more than 90% of the electricity in the country at the moment. Second to hydropower resources in Tajikistan comes the substantial reserves of coal, which is being mined increasingly. In addition to these resources, there are alternative energy sources available, which include a considerable potential of solar energy due to the presence of a significant number of sunny days in the country (on average 280-330 days a year), whereas this source of energy is not widely exploited. The country needs to adopt policies which will help it achieve energy security, guarantee efficiency and produce minimum emission.

Energy Policies of Tajikistan

Despite the challenges in providing energy in the country, Tajikistan is part of the global initiatives towards decarbonization and reduction of emissions. It is part of United Nations Framework convention on Climate

Change, a signatory to Kyoto Protocol and has ratified the Paris Agreement. In addition, there are certain policies that are adopted in the country and several ambitious goals for green energy are set as well. Since the main priority is making energy available for the population, the climate-friendliness is yet to be addressed in practice. Notwithstanding the fact that the most amount of produced energy is based on hydro, the old infrastructure and technical issues still contribute to the loss of energy and inefficiency. According to the IEA review, energy efficiency in the energy policy of Tajikistan is a central subject and it is reflected in the Energy Law of the country, Strategy 2030, and Sustainable Energy for All Tajikistan, aiming at enhancing energy efficiency by 20% in all sectors by the year 2030. Furthermore, several crucial bylaws and secondary legislation necessary for implementing the law are still under review. These include energy performance standards for building envelopes, guidelines for conducting energy audits, and various technical system standards. To implement the policies and achieve the targets, the country needs to add more specificity to make the goals measurable.

Energy policies of EU

The EU energy policies are more comprehensive and have proved to be considerably successful in terms of implementation. Variety of instruments and targets which aim at reducing the emission of greenhouse gases, obtaining improvements in energy efficiency and decarbonization are in place. These policies are made with the commitment to the EU Green Deal, which aims to achieve carbon neutrality by 2050 as well as focusing on energy security in the region. In addition, the EU Energy Trading Scheme (ETS) is another instrument, which decreases emissions by covering a significant number of installations in energy sector. The other instruments for reducing emissions include Energy Performance Standard for Buildings, Efficiency Standard for Cars and Energy Efficiency Directive. As the result of the energy efficiency policies and programs for buildings, which EU started focusing after the 1980s, the consumption of energy has decreased as the new buildings are required to be climate-neutral and performance standards are set for existing buildings when being renovated. Because of the instruments having targets, the detailed planning is presented and the process is monitored, their effectiveness has been proved. According to Patricia Márquez-Sobrino et al. analyzing various energy efforts of EU-27 countries presents that throughout the three stages of European Energy Policy since 2000, with certain differences in each stage due to various factors including the impact of global economic crisis in the second stage, all the countries met and even surpassed their specific targets for having 20% of their final energy consumption from renewable sources, except for France achieving 83% of its target. The main goal is decarbonization and the member states can use different instruments to decrease their emissions. The policies of EU have evolved from time to time while encountering crises, which have contributed to innovation as well.

Lessons for Tajikistan

Tajikistan can use the experience of the EU and implement the similar policies, like carbon pricing and emission trading. The country can start with smaller steps and set higher targets as the technological and financial challenges remain strong. For instance, using the experience of the EU, the country can adopt the energy efficiency standards in the new buildings first, since it is more difficult to be achieved in the existing buildings. Moreover, if Tajikistan adopts emission trading system, it can decrease energy consumption as well as inspire the development of climate friendly technology and bring innovation in energy production. Regional cooperation would also be of potential benefit if Tajikistan with other Central Asian states set common goals and targets for energy efficiency.

To conclude, Tajikistan has the potential to boost its green energy and decrease its GHG emissions, but it requires more intensive policy implementation instruments. In comparison to the EU, the challenges remain greater due to the difficulties in financial terms, shortage of technologies and experience. The country can use the example of EU and adapt the instruments based on its own capacities. As the results of climate change are becoming apparent in Tajikistan with the melting of the glaciers and changes in the river flows

and abnormally hot summers, the reliability on the hydropower decreases. Therefore it is necessary for the country to adopt policies and implement programs that can guarantee both energy security and efficiency and prevent energy loss.

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The Measurement, Reporting and Verification System on Greenhouse Gases in Kazakhstan

By Nizoramo Pallaeva

Abstract

Measurement, Reporting and Verification (MRV) is a comprehensive system designed for gathering, management, analysis, usage and verification of important data connected to climate change. This data includes: adaptation, capacity building, funding, and technology transfer. Mainly there are three types of MRV systems: MRV of GHG emissions, MRV of mitigation actions, and MRV of support. This essay would undertake the MRV on GHG type through the example of Kazakhstan. The paper looks at the activities in direction to decrease GHG in the energy sector. These questions would be answered through the legislative framework as well as complementary measurements that has been done insofar and show the effectiveness of MRV system in the energy sector.

Introduction

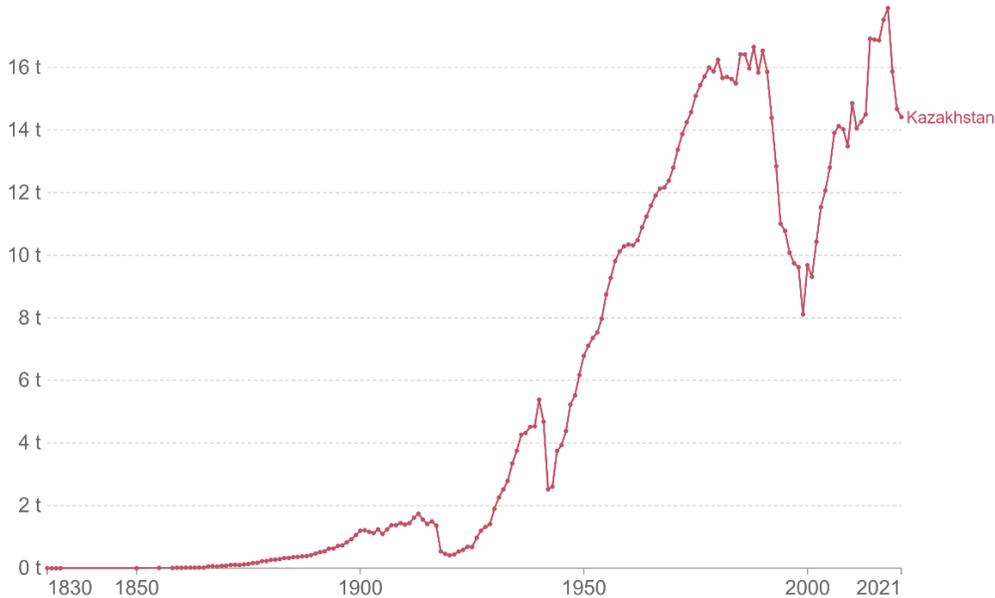
MRV provisions for climate change mitigation were introduced by Paris Agreement, which negotiated in December 2015. All nations including Central Asian countries now share a common transparency system. By committing to this pact, Kazakhstan declared that it would cut its gas emissions by 15% until 2030 (Sopykhanova 2023). The Nationally Determined Contributions (NDCs), which outline the country's mitigation objectives and strategies, were submitted as part of the Paris Agreement. In order to identify trends in emissions, decide where to concentrate greenhouse gas (GHG) reduction efforts, monitor progress made in reducing emissions, track mitigation-related support, and determine whether mitigation actions planned under NDCs or otherwise are proving effective, measurement is necessary (Singh 2016). Reporting and verification are crucial for assuring accountability, transparency, and legitimacy of findings as well as for fostering trust that resources are being used wisely.

Kazakhstan strives towards creating sensible mitigation and adaptation plans, heightening credibility and identifying the impacts on plans and programmes for mitigation and adaptation (Taryn 2009). Overall, in 2019 Central Asian region emitted 710.5 million tons of CO₂ source (REdiCAP 2021). According to figures from Our World in Data below, Kazakhstan has the largest carbon footprint. Being a considerable large oil and gas exporter Kazakhstan emitted 55.7% MtCO₂e (Sabyrbekov 2023). This paper would explore the effectiveness MRV of GHG system in energy sector.

Per capita CO₂ emissions



Carbon dioxide (CO₂) emissions from fossil fuels and industry¹. Land use change is not included.



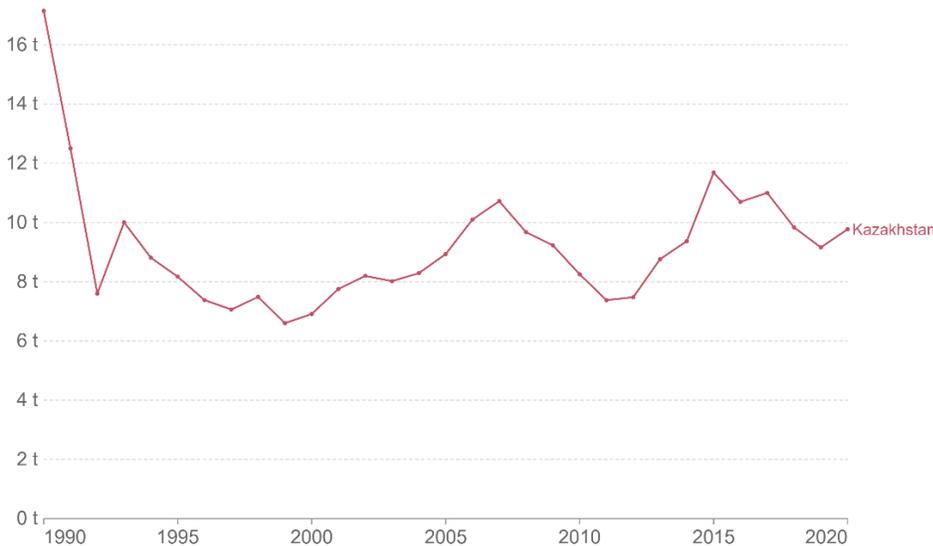
Source: Our World in Data based on the Global Carbon Project (2023) OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO₂) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO₂ includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

Per capita consumption-based CO₂ emissions



Consumption-based emissions¹ are national emissions that have been adjusted for trade. It's production-based emissions minus emissions embedded in exports, plus emissions embedded in imports.



Source: Our World in Data based on the Global Carbon Project (2023) OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

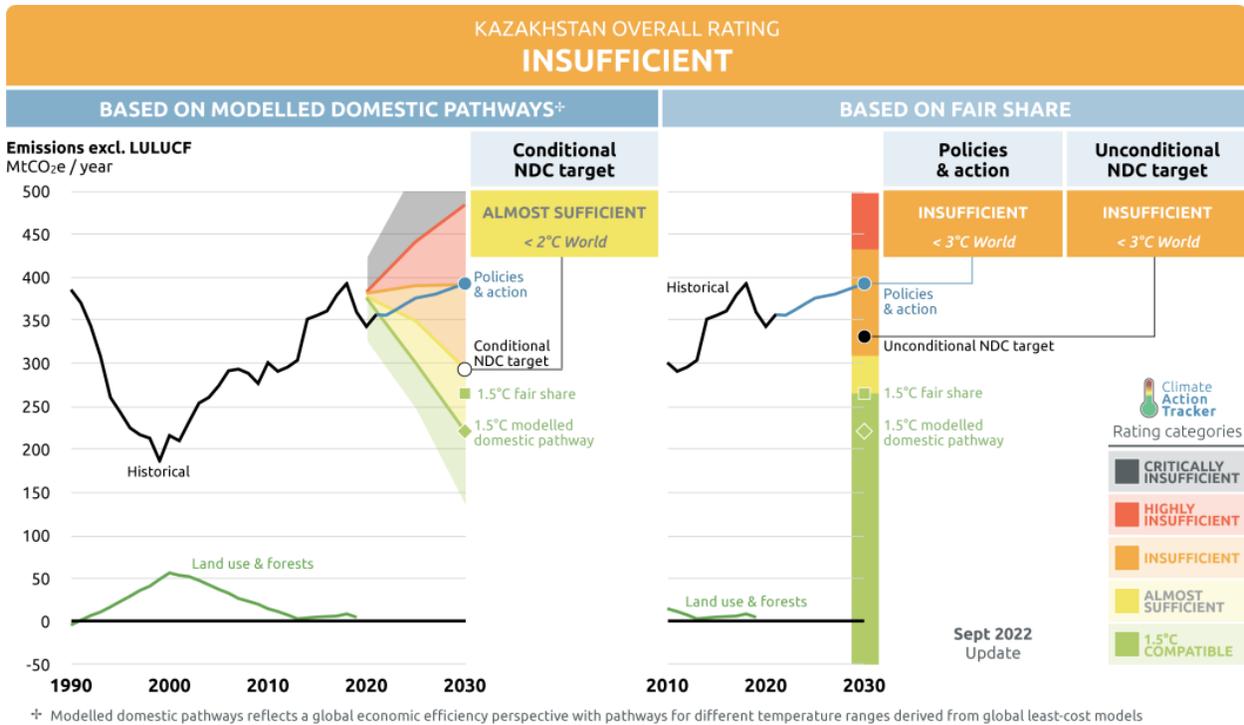
1. Consumption-based emissions: Consumption-based emissions are national or regional emissions that have been adjusted for trade. They are calculated as domestic (or 'production-based' emissions) emissions minus the emissions generated in the production of goods and services that are exported to other countries or regions, plus emissions from the production of goods and services that are imported. Consumption-based emissions = Production-based - Exported + Imported emissions

Methods

The methodological basis of this paper is environmental and legal analysis. The example of Kazakhstan is of interest: firstly it has high CO₂ emission among all Central Asian countries; secondly during the Climate Summit in December 2020, Kazakhstan first declared its ambition to achieve “carbon neutrality” by 2060 (Sabyrbekov 2023). In September 2021, Kazakhstan published its Strategy of Achieving Carbon Neutrality until 2060 as a policy paper, outlining a potential pathway to carbon neutrality with sectorial decarbonization strategies. As of September 2022, Kazakhstan has not officially submitted the long-term strategy (LTS) to the UNFCCC. Aimed at answering the above research question this essay reflects on: what legal steps for MRV legislative framework existing in the Ecological Code of the Republic of Kazakhstan, No. 212 of 2007 and Amendment to said legislation on 3 December 2011. Secondly, this essay uses the Law on Transition to green economy 2016 with the purpose of identifying advanced technologies used in the adjustment of energy consumables through the intelligent systems. Additionally, it would be looked at as a Global Support Programme as a complimentary initiative for GHG inventories, that are undertaken by UN Environment programme, GEF and UNDP support programmes.

Main / Results

The Kazakh government under the settled NDC ratified the United Nations Framework Convention on Climate Change in 1995, and then in 2008 ratified the Kyoto Protocol. National report on the inventory of anthropogenic emissions for 1990-2008 published in 2010. In 2007, the Environmental Code was adopted. Following the state implemented regulation of greenhouse gases. A quota for GHG emissions is issued as an environmental permit (Climate Policy Radar 2023). Mandatory registration of greenhouse gas emissions from stationary sources for large enterprises and submission of reports were implemented. The state inventory and the state cadaster of emissions and removals of greenhouse gases were organized. In 2011, amendments were made to the Environmental Code on the definition of "greenhouse gases", as well as approval of calculation methods were included. Implementation of the verification institute was created. Afterwards, the allocation of quotas or certificates for greenhouse gas emissions allocated. The establishment of market mechanisms improved reporting (like: installation passport, monitoring plan, reduction program). Further carbon units were introduced. There are penalties for exceeding quotas. In 2016, second amendments were made to the Environmental Code, suspending ETS until 2018. Nevertheless, it implemented a hybrid method of quota allocation historical and benchmarking as a result excluded certificate. Then the accreditation of validation bodies transferred to the National Accreditation Center. After a one-year delay, Kazakhstan's Emissions Trading Scheme (ETS) started operating again in 2018. Due to the large number of free quotas and the lenient benchmarks, the extent of emissions reductions to date has been small. The current ETS Phase 5 will last from 2022 to 2025. A cap of 537.2 MtCO₂ for the same time period, aimed at emissions from 199 installations owned by 128 corporations, is also included. The ETS charges 1.10 USD/tCO₂ for carbon. Benchmark coefficients are anticipated to stay the same even though the new phase intends to reduce free quotas by 26% through 2025. It is unknown if the new allocation scheme will result in better carbon reductions (Climate Policy Radar 2023).



Role of the MRV system has strong collaboration with the Ministry of Ecology and forms certain public policy and as independent inventory JSC Zhasyl Damu established that maintains the state cadastre. State register forms a national inventory and has a new function that checks the reports of users of natural resources for correctness of filling. Nevertheless, the above graph shows different facts. The clarity, target architecture, and scope of Kazakhstan's carbon neutrality target may all be significantly improved. The net zero target is rated as "Poor" by Climate Action Tracker. It performs control and supervisory functions as well as endorses projects in order to reduce emissions and increase absorption.

The National Accreditation Center (under the Committee for Standardization and Technical Regulation) issues accreditation by a verifier. It controls the work of verifiers. Implements ISO standards and enforces those standards. On the level of enterprise, annual the GHG inventory report is submitted, providing the Installation Passport and Monitoring Plan 1 time for the period of validity of the National Quota Allocation Plan thus ensuring compliance with the received quota (Mustaeva 2020).

On local entrepreneur level, startups are giving customers the tools they need to simply track their consumption and adopt more environmentally responsible habits. Some startup solutions enable optimum control in addition to energy consumption monitoring. Calculations for banks, businesses, and 3D animation studios through the Internet are possible. These computations produce heat, which is then used to warm the building. While offering free, environmentally friendly heating, this technology significantly lowers the carbon footprint of computing (Zhumabayev et al., 2022).

Conclusion

Summing up Kazakhstan has made strides in adopting MRV regulations for mitigating climate change. On the other hand for functioning even more effectively there is a niche to be worked on the formal ratification of new techniques for estimating greenhouse gas emissions. Decrease of high enterprise resistance of the greenhouse gas regulator. There are certain advantages observed as well as nationwide inventory is being conducted by a small group of professionals. Important initiatives include enhancing computation techniques, strengthening the regulator's capabilities, and overcoming enterprise resistance. The MRV

system is made more successful by the deployment of cutting-edge technologies and involvement in international support initiatives. For the achievement of 2060 carbon neutrality Kazakhstan shall overcome these obstacles and consistently enhance the MRV framework, thus it may improve its strategies for mitigation and adaptation, lower its carbon footprint, and participate in international efforts to combat climate change.

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The Construction of Nuclear Power Plant in Kazakhstan: Can Kazakhstan Manage its Nuclear Energy

By Nazerke Mukhamediya

In an era when global environmental risks are becoming increasingly complex, every country needs to adapt its policies, economies, and social spheres to face these crises. And Central Asia is no exception. Given Kazakhstan's coal dependency and high carbon emissions, it is hard to imagine how the country will achieve carbon neutrality by 2060, as promised. One solution that is frequently debated in global energy discussions is nuclear energy. Considering Kazakhstan's abundant natural resources and its global leadership in uranium production, the country is planning to make a nuclear leap.

Is Kazakhstan ready to manage nuclear energy? What are the environmental and political risks associated with building a nuclear power plant? And what is the public opinion in this regard? These are the central questions that this essay aims to address.

Giving the context

The construction of a nuclear power plant in Kazakhstan has been on the agenda since the early 1990s. However, under Tokayev, the agenda has taken on a new character. The issue became even more politicized, almost immediately after the change in leadership 2019, when Putin proposed building a nuclear power plant in Kazakhstan.

The site for the nuclear power plant was selected in Ulken village, Almaty Oblast, on the shore of Lake Balkhash. Chinese, Korean, Russian, and French companies were shortlisted as suppliers. There were a lot of debates around NPP, but this year Tokayev announced the national referendum, saying that the final decision will be made by the people.

The main arguments for the construction of NPPs include the need to diversify the energy sector, and looming energy crisis, the clean nature of nuclear power, Kazakhstan's leading position in the uranium sector (Kazakhstan produces fuel for China), and economic benefits. However, despite these factors, there are still uncertainties about who will be a partner and how it will be governed.

Nuclear Past and Political Factors

As Togzhan Kassenova highlights, "Kazakhstan's nuclear past is relevant to its nuclear future in several ways." Globally, Kazakhstan is known for its success in denuclearization, which Kassenova says makes the country a good candidate to become an international "fuel bank," also given its nuclear infrastructure. Also, speaking of the nuclear past, while there are no major proliferation risks, there is a danger that some will be interested in the waste itself or natural uranium for terrorist or financial purposes.

Likewise, speaking about the uranium industry is not possible without mentioning the nuclear fuel cycle (see Figure 1). An important point is that Kazakhstan has intentions to establish a full production facility; however, it faces difficulties due to the political implications from some international actors. The enrichment part of the cycle is currently carried out in Russia. Also, the enrichment of uranium is sensitive due to its potential threat to be used for weapons.

Nuclear fuel cycle

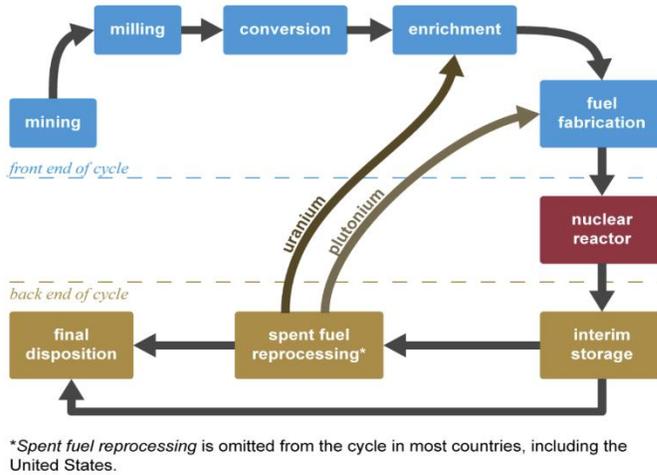


Figure 1. Nuclear Fuel Cycle

As we can see, this issue is also highly politicized. One major concern is determining who will be the partner for NPP and whether Kazakhstan will be able to avoid high dependency on other players. Here important question arises. Who will be the key partner for Kazakhstan's nuclear power plants? Russia has repeatedly stated in recent years that it is ready to help, which aligns with its intention to become a leader in the nuclear sector (see Figure 2). And in this regard, whether NPP will share the fate of the Zaporozhskaya NPP. Despite many debates, North Kazakhstan remains as sensitive region due to its separatist risks. Alternatively, China, which is actively expanding its influence in the region's energy sector, could emerge as a key player.

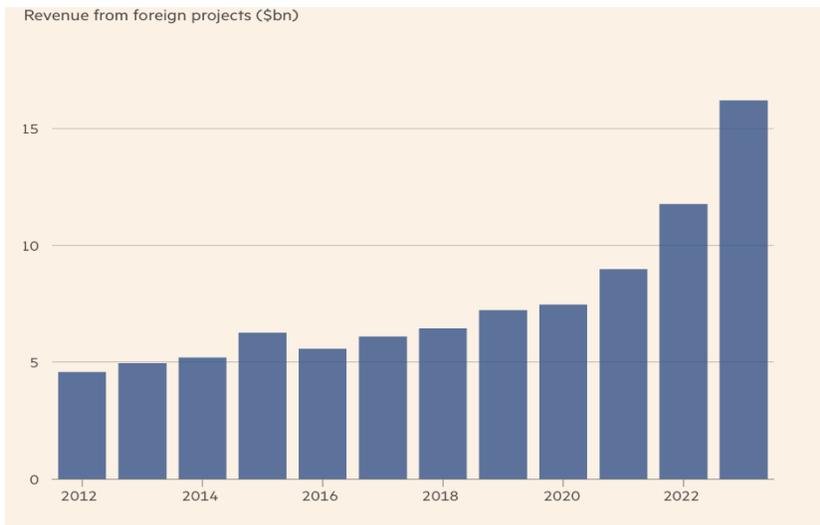


Figure 2. Rosatom revenue from foreign projects (\$bn)

This also raises questions about how NAC Kazatomprom will build relationships with foreign partners and ensure transparency. The company frequently attracts attention, particularly due to the 14-year imprisonment of Mukhtar Dzhakishev on corruption charges. Some attributed his arrest to Russian influence and Dzhakishev's ambitions to enter the international market.

Public opinion

Since 2023, there have been ongoing public hearings regarding the construction of the nuclear power plant. Examining the proceedings of these hearings reveals how contentious and divisive the issue is within society. As Peter Howie and colleagues noted in their survey, the population is split into two main groups: those concerned about the potential environmental and health impacts of the nuclear power plant, and those who support its construction for the potential economic benefits, including job creation.

Given the trauma and experiences associated with the Semipalatinsk test site, as well as the awareness of the Chernobyl disaster and Russia's war against Ukraine, these are among the common factors in opposition to the construction of nuclear power plants. It is also important to recognize that believing nuclear energy is safe with proper management is not true. This is not to mention the level of the country, where cities without heating in winter are not a surprise.

In her interview, Kaisha Atakhanova, a winner of the Goldman Environmental Prize, argues that the public has a one-sided view of nuclear power due to extensive lobbying that focuses only on the benefits of nuclear energy. However, there is no information about alternative paths and risks, and it is important to unite before the referendum to convey comprehensive information to the public. Indeed, Kazakhstan already had a strong nuclear movement. Additionally, many activists warn that Balkhash is already facing environmental threats and that the addition of a nuclear power plant could exacerbate these issues.

Based on the above, we can see that the opposition is primarily driven by grassroots initiatives. For instance, the Unsafe Nuclear initiative, which actively opposes the plant, believes that it poses a threat to the environment, the population of the Central Asian region, and the national security of Kazakhstan.

In the charts below, you can review the survey by Demoscope and PaperLab regarding NPP. The survey illustrates how divided and informed citizens are on the issue of NPP. (See Figure 3,4)

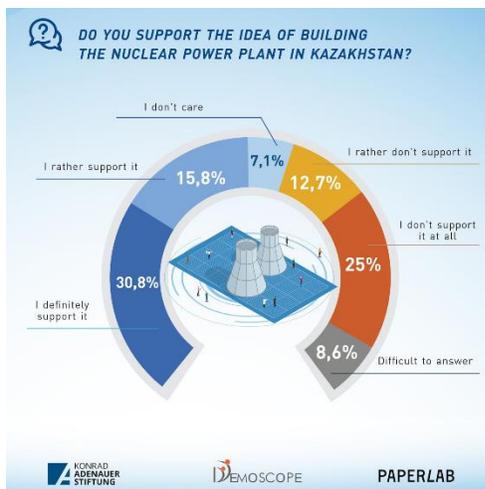


Figure 3. How many % support the building of the NPP?

Demoscope

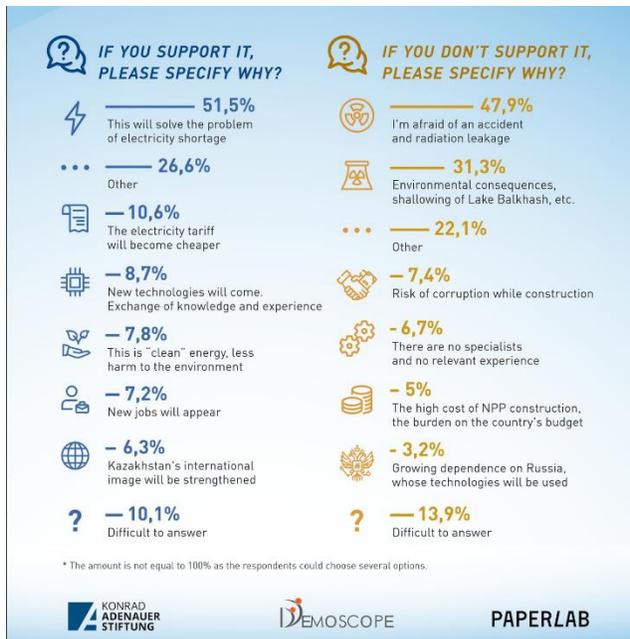


Figure 4. Reasons for support and opposition of

NPP. Demoscope

In conclusion, the issue of nuclear power plants is complex for Kazakhstani society and the referendum results will show whether Kazakhstan will develop its nuclear power or not. However, at this stage, we can see how uninformed the society is about risks that exist for Kazakhstan and its citizens. Additionally, even if we agree that nuclear energy is needed and has benefits for the economy and energy diversification, there are still big doubts about the governance and partners, at least for the next two decades.

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Carbon Tax in Central Asia

By Aida Yessimova

To begin with, a carbon tax is a fee imposed on the burning of carbon-based fuels, aimed at reducing greenhouse gas emissions. Currently, Kazakhstan is the only Central Asian country with an implemented carbon pricing instrument, specifically an Emission Trading Scheme (ETS) introduced in 2013. The primary objective of a carbon tax is to incentivize businesses and individuals to reduce their carbon footprint by making fossil fuel consumption more expensive. This economic tool is vital in addressing global climate change as it promotes the transition to renewable energy sources, thus reducing overall greenhouse gas emissions. Implementing carbon taxes is essential for mitigating climate change impacts, driving sustainable economic growth, and achieving international climate targets, to discuss carbon tax in Central Asia, it is important to understand the emissions of the given area, relevance of implementing the taxation, and possible future changes.

When it comes to emissions, Central Asia comprises five countries: Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan. Each country has varying levels of greenhouse gas emissions, contributing differently to the region's carbon footprint. Kazakhstan is the largest emitter, producing 396 million tons of CO₂ equivalent (MtCO₂e) in 2018, primarily from its extensive fossil fuel use. Uzbekistan follows, emitting around 205 MtCO₂e annually, with 89.4% originating from the energy sector. Turkmenistan, with its high energy and carbon intensity due to oil and gas exploitation, emitted 85 MtCO₂e in 2019. In contrast, Kyrgyzstan and Tajikistan have significantly lower emissions, with 15 MtCO₂e and 9.5 MtCO₂e respectively, largely due to their reliance on hydropower, which is a cleaner energy source. The major sources of emissions in Central Asia are predominantly from fossil fuel combustion for energy production and industrial activities. Kazakhstan, Uzbekistan, and Turkmenistan, with their heavy dependence on oil and gas, are the primary contributors, while Kyrgyzstan and Tajikistan's emissions remain lower due to their significant use of renewable energy. This diverse energy landscape highlights the need for tailored carbon reduction strategies across the region.

A carbon tax is particularly relevant for Central Asia due to the region's heavy reliance on fossil fuels and significant greenhouse gas emissions. Implementing a carbon tax can drive Central Asian countries towards cleaner energy sources, thereby reducing their carbon footprint and contributing to global climate goals. For instance, Kazakhstan, Uzbekistan, and Turkmenistan are major emitters due to their dependence on oil and gas. A carbon tax could incentivize these countries to transition to renewable energy, thereby mitigating their environmental impact.

The environmental benefits of a carbon tax are substantial. By making fossil fuel consumption more expensive, a carbon tax encourages the adoption of renewable energy sources like wind, solar, and hydropower. This shift can significantly reduce greenhouse gas emissions, improve air quality, and help preserve natural ecosystems. Economically, a carbon tax can generate revenue that can be reinvested in sustainable development projects, such as upgrading energy infrastructure and funding green technologies. This can spur economic growth, create jobs in the renewable energy sector, and reduce dependence on imported fuels. Socially, implementing a carbon tax can lead to improved public health by reducing air pollution, which is a significant issue in many Central Asian cities. Cleaner air can decrease the incidence of respiratory and cardiovascular diseases, improving overall public health outcomes.

However, there are challenges and concerns associated with implementing a carbon tax in Central Asia. One significant challenge is the potential economic impact on low-income households and small businesses that may struggle with increased energy costs. To address this, governments can implement measures such as tax rebates, subsidies, or social safety nets to protect vulnerable populations. Additionally, there may be political resistance and a lack of institutional capacity to effectively administer and enforce a carbon

tax. Overcoming these challenges will require strong political will, capacity building, and regional cooperation to share knowledge and best practices. By addressing these challenges and leveraging the benefits, a carbon tax can play a crucial role in steering Central Asia towards a sustainable future.

Next, the essay will attempt to answer the question “What changes Central Asia might see in 50 years?” Integrating a carbon tax in Central Asia over the next 50 years is expected to have profound economic and environmental impacts. Drawing from models and case studies in regions like Europe, which has successfully implemented carbon pricing mechanisms, Central Asia could see a significant reduction in greenhouse gas emissions. For example, the European Union's Emission Trading Scheme (ETS) has led to a notable decline in emissions and increased investment in renewable energy.

Economically, the revenue generated from carbon taxes can be reinvested in sustainable infrastructure, fostering economic diversification and reducing dependence on fossil fuels. This can spur innovation in renewable energy sectors, create green jobs, and enhance energy security. Environmentally, a well-implemented carbon tax can lead to cleaner air, reduced health costs associated with pollution, and a substantial decrease in carbon emissions. By 2070, Central Asian countries could achieve significant milestones towards carbon neutrality, mirroring the successes seen in countries with long-standing carbon pricing policies.

While initial economic adjustments may be challenging, long-term benefits include a more resilient economy and improved public health. To maximize these outcomes, Central Asia will need to ensure robust policy frameworks and regional cooperation, learning from global best practices.

In conclusion, this essay has explored the concept of a carbon tax, its current status in Central Asia, and its relevance and importance. We've examined the region's emissions, highlighting Kazakhstan as the largest emitter, followed by Uzbekistan and Turkmenistan. The benefits of a carbon tax include environmental protection, economic diversification, and improved public health, despite challenges such as economic impacts and political resistance.

Adopting a carbon tax is crucial for sustainable development in Central Asia, driving the transition to renewable energy and reducing greenhouse gas emissions. Policymakers should focus on creating robust frameworks, investing in capacity building, and ensuring social protections to mitigate economic impacts. Future steps include regional cooperation and learning from successful models like the European Union's ETS. By embracing these strategies, Central Asia can achieve significant progress towards a sustainable and resilient future.

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