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The legal regulation of climate policy in the field of greenhouse gas emissions: global challenges and ways of adaptation of Kazakhstan

The article focuses on examining the legal framework governing climate change and ecosystem protection, highlighting both international and national strategies. Key global agreements, such as the UN Framework Convention on Climate Change and the Paris Agreement, as well as Kazakhstan's legislative measures aimed at reducing greenhouse gas emissions and fostering sustainable economic growth, are analyzed. Particular attention is given to Kazakhstan's efforts to meet international commitments, including the introduction of an emissions trading system, the establishment of carbon budgeting standards, and the development of environmental regulations. The study aims to explore the challenges Kazakhstan faces in adapting to climate change and the role of legal norms in promoting green technologies and sustainable development. The research methodology combines legal analysis, a comparative approach (examining international and national contexts), analysis of empirical data, and evaluation of policies and laws regarding their environmental impact in Kazakhstan. The authors underline the necessity of robust legal frameworks in climate policy to achieve sustainable development, enhance energy security, and ensure social equity. The conclusion highlights the importance of refining legislation to reduce greenhouse gas emissions and facilitate the transition to a low-carbon economy, contributing to the effective realization of sustainable development goals and emission reductions.

Keywords: environment, environmental law, international standards, the right to a healthy environment, state waste regulation, waste emissions, greenhouse gas emissions, climate change legal regulation, environmental harm mitigation, liability for waste management violations, emissions trading system, free quotas.

Introduction

One of the most pressing issues of our time is the protection of the environment and the responsible use of natural resources. Nature forms the foundation of human existence, supplying essential material, energy, and spatial resources. Humanity relies on water, soil, air, biodiversity, land, and renewable energy sources such as solar power, wind, and tidal currents. Beyond serving as a source of resources for living and leisure, nature acts as a sink for emissions and waste, underscoring the critical need for its preservation to ensure a sustainable future.

As part of the global community, Kazakhstan cannot independently address the challenges posed by climate change. Without clear legal frameworks and robust international agreements to curb greenhouse gas emissions, the consequences of global warming, such as rising sea levels, extreme weather events, and loss of biodiversity may become irreversible.

To effectively adapt to climate change, it is essential to establish strong legal regulations and reliable indicators for monitoring air temperature, precipitation, and greenhouse gas emissions. Kazakhstan collaborates with the international community to regulate these areas by enacting laws and creating targeted plans. For example, climate change was a central topic during the 28th session of the UN Conference, where agreements were reached to reduce reliance on fossil fuels, including coal, oil, and gas. The extraction of these fuels is a significant source of greenhouse gas emissions, which harm the environment.

In its efforts to transition towards lower emissions in the energy sector and enhance energy efficiency, Kazakhstan faces several challenges. These include outdated thermal power plant infrastructure, insufficient

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implementation of mixed financial instruments to support green business projects, and underutilization of renewable energy technologies.

This study focuses on analyzing international climate policy documents related to greenhouse gas emissions while examining the legal aspects and adaptive measures within Kazakhstan's legislation to address global climate challenges. International standards and commitments promote global cooperation and enhance global responsibility to address climate challenges.

The world community refers to the following documents that take into account the global nature of climate change:

- The UN Stockholm Declaration of June 16, 1972 on the problems of the human environment;
- UN General Assembly resolution 44/228 of December 22, 1989 on the United Nations Conference on Environment and Development;
- Resolutions 43/53 of 6 December 1988, 44/207 of 22 December 1989, 45/212 of 21 December 1990 and 46/169 of 19 December 1991 on the protection of global climate for the benefit of present and future generations of mankind;
- The 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, as amended and amended on June 29, 1990;
- The United Nations Framework Convention on Climate Change of May 9, 1992. (Kazakhstan ratified the Convention on 05/17/1995);
- Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) dated December 11, 1997 (date of ratification of the Kyoto Protocol 19.06.2009);
- General Assembly resolution 70/1 of September 25, 2015. Transforming our world: The 2030 Agenda for Sustainable Development (Kazakhstan ratified the Paris Agreement on 12/06/2016).

These and other important documents laid the foundation for stimulating activities in areas of great importance to humanity and the planet.

In accordance with the principles and provisions of international documents and standards, as well as the 2030 Agenda for Sustainable Development, States have adopted new global goals (17 goals for transforming our world) in the field of sustainable development. Thus, the program of global actions of people and the planet in the XXI century was proclaimed. Where the fight against climate change and environmental protection are a kind of call to action to eliminate poverty in the world, emphasizing the urgent need for "greening" (that is, the implementation of projects in accordance with socio-environmental standards in the field of environmental and social obligations) of these goals. At the same time, States have the right to determine their environmental and development policies. At the same time, States must be held accountable for their actions that harm the environment.

Cooperating with the international community, our republic in responding to climate change has adopted the Environmental Code of the Republic of Kazakhstan [1]. Based on current legislation, environmental standards, management goals and priorities are being developed, taking into account economic and social costs.

The main instrument for the implementation of countries' commitments to limit and reduce greenhouse gas emissions into the atmosphere is the nationally determined contributions of countries to climate change mitigation.

The stated climate goals serve as a guideline for the development of domestic national legislation designed to ensure the achievement of these goals through the adoption of appropriate public policies and mechanisms. As the ONUV is revised and emission reduction targets are tightened in accordance with the Paris Agreement, measures may be revised. To achieve the goals, the authors investigated the requirements of international acts and regulations, as well as their relationship for their adaptation to legislation in the field of ecology.

It is difficult to overestimate the importance of legal regulation of climate control, since it plays a key role in ensuring sustainable development, protecting ecosystems and minimizing the negative impact of human activities on the climate.

Without clear legal norms and international agreements aimed at reducing greenhouse gas emissions, global warming can lead to irreversible climate changes, including sea level rise, extreme weather events and loss of biodiversity. The adopted laws are constantly being updated, nationally determined deposits are being tightened (according to the norms of the Paris Agreement, deposits should be updated every 5 years) and requires constant systematization and improvement of mechanisms for the implementation of best practices.

Methods and materials

Nature is a shared heritage of humanity, and the global community endeavors to address the challenges of the climate crisis through coordinated efforts and effective solutions. The article, dedicated to the legal regulation of climate change, employs a comprehensive approach that integrates international and national legal frameworks, with a focus on the specific legislative measures of the Republic of Kazakhstan.

The analysis of international agreements involves a systematic examination of global treaties such as the UN Framework Convention on Climate Change and the Paris Agreement, exploring their provisions, requirements, and the influence of these commitments on national legislation.

In studying Kazakhstan's national legislative initiatives, the article employs a legal analysis of current laws and regulations to evaluate their effectiveness in achieving climate-related objectives. This assessment highlights strengths and areas needing improvement within the existing framework.

To explore the challenges and barriers to adaptation, the study identifies critical obstacles faced by Kazakhstan in addressing climate change. These include underdeveloped infrastructure for adopting green technologies, insufficient legal support, and weak coordination between government institutions and the private sector.

The empirical method assesses Kazakhstan's environmental indicators, including greenhouse gas emissions, ecosystem health, and population well-being. This evaluation is grounded in data from governmental sources and reports by environmental organizations, providing a data-driven perspective on the state of the environment and progress toward climate goals.

Results

This study examines the international and Kazakh legal frameworks, along with measures implemented to address climate change and protect ecosystems, with a focus on the legal regulation of greenhouse gas emissions.

As part of its commitments under the Paris Agreement, Kazakhstan is actively evaluating its existing systems for measuring and reporting the outcomes of initiatives aimed at adapting to and mitigating the effects of climate change. Achieving carbon neutrality in the current century necessitates robust and consistent legal oversight of greenhouse gas emissions. The demand for a clear and comprehensive legislative framework to facilitate the implementation of international agreements is becoming increasingly urgent. Global warming and climate change demand prompt action, requiring collective efforts and adherence to timely and effective legal measures.

Today, Kazakhstan has a Strategy for achieving carbon neutrality of the Republic of Kazakhstan until 2060.

Kazakhstan is guided by the following principles for the implementation of the Strategy: purposefulness, unity and integrity; feasibility, fairness of transition; circular economy; phasing; openness and interaction with society; rationality (balance). All actions should be based on a set of these principles and contribute to achieving carbon neutrality goals by 2060.

The Ministry of Ecology and Natural Resources of the Republic of Kazakhstan (MENR RK) is the responsible body for conducting an inventory of greenhouse gases in the Republic of Kazakhstan. In accordance with the obligations of the Republic of Kazakhstan under the UNFCCC (United Nations Framework Convention on Climate Change), as well as in accordance with the Environmental Code of January 2, 2021, the MENR of the Republic of Kazakhstan annually prepares a national report on the emission inventory for industrialized countries [2].

On an annual basis, States provide information to the secretariat (Bonn, Germany) of the Kyoto Protocol and the body monitors compliance by States with their emission obligations [3].

These registries, in addition to accounting for unit stocks, take into account emissions trading, forming the basic infrastructure for the carbon market. The registry system ensures transparency and the ability to hold Parties accountable. The system also brings together key actors from various sectors and directions to increase climate ambitions and intensify action, stimulating even more meaningful steps.

In order to achieve low-carbon neutrality, the state needs to continue the following steps:

- to provide a legislative and institutional environment that meets the requirements of international agreements and takes into account the specifics of the national foundations and infrastructure of the country;

- create incentives for the modernization of existing industrial facilities by attracting international private investment in the decarbonization process;

- motivate private businesses by providing targeted support measures to socially vulnerable groups of the population;

- to introduce new information technologies for the control and monitoring of emissions at the national, sectoral and regional levels to digitalize the process;

- to implement advanced international standards in all sectors of the economy in order to make the transition to alternative and renewable energy sources (for example, reducing fuel and energy consumption, switching to ecological modes of transport, etc.).

Discussion

At first glance, the solutions may seem obvious, but problems arise when they are implemented. Many of these problems are related to the correct definition of the mechanisms of interaction between the state and citizens. That is, the adoption by the state of all necessary laws in the field of sustainable development shows insufficiency, therefore it should include such works as bringing legislation to the level of awareness of everyone, constant promotion of educational programs, continued active introduction of innovative technologies and methods in the field of sustainable economic growth and tougher liability for violations of legislation [4; 18].

Within the framework of the Paris Agreement, Kazakhstan is obliged to report on its nationally determined climate contributions and on its long-term development strategies with low greenhouse gas emissions after 2020.

Within the framework of the Paris Agreement, Kazakhstan has committed itself to reducing greenhouse gas emissions from 1990 levels (386.3 million tons) by 15 % (an unconditional goal) by 2030 (328.3 million tons). At the same time, according to the Strategy, there is a conditional goal — provided that international support is received to decarbonize the economy by reducing emissions by 25 %. More than 70 % of all greenhouse gas emissions come from the fuel and energy sector of Kazakhstan [5].

From February 16, 2005 (entered into force) under the Kyoto Protocol countries must limit and reduce greenhouse gas emissions in accordance with agreed national commitments.

The high level of greenhouse gas emissions in the energy sector is explained by the significant use of fossil fuels, which in 2020 accounted for 97.9 % of the total primary energy, while the share of alternative energy sources did not exceed 1.4 % [6].

Among the main tools to achieve the goal of the commitment to reduce emissions under the Paris Agreement is the National Emissions Trading System (ETS). The STV was implemented in stages: the first phase began in 2013 [7] — marked the beginning of the implementation of decarbonization measures; during the second stage in 2014-2015 [8] quotas were sold on the stock exchange for the first time. In 2015, the 3rd National Plan for the Allocation of quotas for Greenhouse Gas Emissions was developed. In 2016, the system had to be suspended in terms of quota allocation to make improvements. The third trading period of the ETS after the introduction of comprehensive amendments was launched on January 1, 2018 [9].

To date, the Kazakh national system reflects 43 % of the total national greenhouse gas emissions (in the metallurgical, electric power, oil and gas, chemical, mining, as well as in some (related to the production of building materials such as cement, brick, lime) manufacturing industries).

Since March 28, 2022, the "Rules of state regulation in the field of greenhouse gas emissions and removals" have been in force in the Republic of Kazakhstan [10].

In accordance with Article 286 of the Environmental Code of the Republic of Kazakhstan [1] in our country, the carbon balance should not exceed the allowable amount established for the carbon budgeting period (5 consecutive calendar years). The carbon budget determines the volume of quota-based and non-quota-based greenhouse gas emissions.

It is important to note that carbon quotas are currently provided to enterprises free of charge within the framework of the National Plan. In practice, allocated quotas often exceed production volumes and exceeding quotas does not encourage them to develop projects aimed at reducing greenhouse gas emissions.

In the statistical collection provided by the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan for 2018–2022, environmental costs show an increase: in 2018 — 302,177,008 tenge, in 2019 — 420,392,105 tenge, in 2020 — 384,015,734 tenge, in 2021 — 416,955,575 tenge, in 2022 — 444,514,269 tenge.

But despite the annual increase in expenses, the company is slowly moving from the budget to environmentally innovative projects.

In 2018 — 84, 2019 — 72, 2020 — 65, 2021 — 88, 2022 — 97 enterprises took steps in the field of sustainable development, reducing the share of projects and products on greenhouse gas emissions.

Based on these and other indicators, the average life expectancy shows an increase: in 2018 — 73.15 years, in 2019 — 73.18, in 2020 — 71.37, in 2021 — 70.23, in 2022 — 74.44 [11].

The operator of the carbon unit trading system in the Republic of Kazakhstan is JSC Zhasyl Damu. In order to ensure the functioning of the carbon unit trading system in the republic, the organization forms the state register of carbon units. The services of the carbon unit registry are provided through a personal account through an electronic digital signature. That is, Kazakhstani companies and individuals can register without hindrance. But foreign companies and individuals do not always have the opportunity to come to our country and get access to this portal, which creates barriers to investment.

Emissions trading is becoming increasingly important worldwide as a suitable tool to combat climate change. However, in the absence of a global carbon market, unilateral carbon policies may eventually lead to carbon leakage, especially since carbon prices will rise in the future to achieve more ambitious emission reduction goals [12].

Industrial enterprises bear a significant share (92.8%) of environmental protection costs in line with the obligations set by the Paris Agreement. The statistical collection contains data on many indicators, and it can be argued that improvements in greenhouse gas emissions have a positive effect on public health to varying degrees. Due to the rapid heating of our planet, weather conditions change over time and the natural balance is disrupted, creating great risks for people and harming public health.

Environmental factors claim the lives of about 13 million people every year. Changing weather conditions lead to the spread of diseases, and extreme weather events increase mortality and complicate the work of health systems [13].

Kazakhstan's legal path to a sustainable energy future is linked to global cooperation in the field of adaptation to climate change. Using only a national carbon trading system or the inability to enact specific laws may prevent emissions from being reduced to the target limit, leading to an increase in global temperatures above 1.5 °C.

Despite the global measures being taken to combat climate change, everyone can make a personal contribution to reducing greenhouse gas emissions. For example, residents can reduce food waste or occasionally refrain from using their personal cars. Such actions help not only to support the efforts of legislators to tighten environmental standards, but also facilitate the transition to new legislative changes.

Conclusions

The study highlights that legislative measures undertaken by the state to reduce greenhouse gas emissions have the potential to address not only issues related to air temperature, precipitation, and emissions but also to positively impact various aspects of human life. These initiatives, foremost, contribute to enhancing public health and overall well-being.

International frameworks such as the UN Framework Convention on Climate Change, the Paris Agreement, and the Kyoto Protocol serve as foundational mechanisms for coordinating global actions. On the national level, legislative tools like Kazakhstan's Environmental Code and greenhouse gas accounting systems ensure the effective implementation of these international obligations.

Comprehensive progress indicators suggest Kazakhstan is increasingly prepared to adopt adaptive measures. However, the country's carbon market policies and related legislation must evolve to encourage enterprises to actively reduce greenhouse gas emissions. This requires the continuous refinement of environmental legal norms, informed by emerging data and insights in this domain.

Systematic reforms encompassing investment, technical regulation, and legal frameworks, particularly in key economic sectors, are essential to advancing emissions reductions and addressing climate change challenges.

Clear and stable legal frameworks in climate policy enhance predictability for private investors, fostering the development of green technologies and promoting investments in circular and sustainable development practices. This approach supports the transition to a low-carbon economy, strengthens energy security, and advances social equity in the face of a changing climate.

The legal regulation of climate control transcends mere ecosystem protection; it is a critical instrument for ensuring security, driving sustainable economic growth, and fostering international cooperation in the fight against climate change.

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Парниктік газдар шығарындылары саласындағы климаттық саясатты құқықтық реттеу: жаһандық сын-қатерлер және Қазақстанның бейімделу жолдары

Мақала климаттың өзгеруі мен экожүйелерді қорғау саласындағы құқықтық реттеуді халықаралық және ұлттық тәсілдерге баса назар аудара отырып, талдауға арналған. БҰҰ-ның Климаттың өзгеруі туралы Негіздемелік конвенциясы және Париж келісімі сияқты негізгі халықаралық келісімдер,

сондай-ақ парниктік газдар шығарындыларын азайтуға және тұрақты экономикалық өсуге бағытталған Қазақстан Республикасының заңнамалық бастамалары қаралған. Шығарындылардың сауда жүйесін, көміртегі бюджетінің нормаларын және экологиялық стандарттарды дамытуды қоса алғанда, халықаралық міндеттемелерді орындау үшін Қазақстан қабылдайтын шараларға ерекше назар аударылады. Зерттеудің мақсаты — климаттың өзгеруіне бейімделу процесінде елдің алдында тұрған қиындықтарды, сондай-ақ «жасыл» технологиялар мен тұрақты дамуды ынталандырудағы құқықтық нормалардың ерекшеліктерін зерделеу. Зерттеу мақсатына қол жеткізу үшін құқықтық талдаудың, салыстырмалы тәсілдің (халықаралық және ұлттық контекстер), деректерді эмпирикалық талдаудың және саясат пен заңнаманы олардың Қазақстанның экологиялық жағдайына әсері тұрғысынан бағалаудың үйлесімі сияқты мақала әдістері таңдалды. Авторлар тұрақты дамуды қамтамасыз ету, энергетикалық қауіпсіздік пен әлеуметтік әділеттілікті арттыру үшін климаттық саясат саласындағы нақты құқықтық нормалардың маңыздылығын атап көрсетеді. Қорытындыда тұрақты даму мақсаттарына неғұрлым тиімді қол жеткізу және шығарындыларды азайту үшін парниктік газдар шығарындыларын азайтуға және төмен көміртекті экономикаға көшуді қолдауға бағытталған заңнаманы жетілдіру қажеттілігіне баса назар аударады.

Кілт сөздер: қоршаған орта, экологиялық заңнама, халықаралық стандарттар, қолайлы қоршаған ортаға құқық, қалдықтарды мемлекеттік реттеу, қалдықтар шығарындылары, парниктік қалдықтар шығарындылары, климаттық өзгерістерді құқықтық реттеу, қоршаған ортаға зиянды азайту, қалдықтармен жұмыс істеу саласындағы нормаларды бұзғаны үшін жауапкершілік, шығарындыларға квоталар саудасы жүйесі, тегін квоталар.

А. Абдижами, Д. Рустембекова

Правовое регулирование климатической политики в области выбросов парниковых газов: глобальные вызовы и пути адаптации Казахстана

Статья посвящена анализу правового регулирования в области изменения климата и защиты экосистем с акцентом на международные и национальные подходы. Рассмотрены основные международные соглашения, такие как Рамочная конвенция ООН об изменении климата и Парижское соглашение, а также законодательные инициативы Республики Казахстан, направленные на сокращение выбросов парниковых газов и обеспечение устойчивого экономического роста. Особое внимание уделено мерам, принимаемым государством для выполнения международных обязательств, включая систему торговли выбросами, развитие норм углеродного бюджета и экологические стандарты. Целью исследования является изучение вызовов, с которыми сталкивается страна в процессе адаптации к изменению климата, а также выявление особенностей правовых норм, стимулирующих «зеленые» технологии и устойчивые развития. Для достижения целей исследования были выбраны методы статьи, которые представляют собой сочетание правового анализа, сравнительного подхода (международный и национальный контексты), эмпирического анализа данных и оценки политики и законодательства с точки зрения их влияния на экологическую ситуацию в Казахстане. Авторы подчеркивают важность четких правовых норм в области климатической политики для обеспечения устойчивого развития, повышения энергетической безопасности и социальной справедливости. Заключение акцентирует необходимость совершенствования законодательства, направленного на снижение выбросов парниковых газов и поддержку перехода к низкоуглеродной экономике для более эффективного достижения целей устойчивого развития и снижения выбросов.

Ключевые слова: окружающая среда, экологическое законодательство, международные стандарты, право на благоприятную окружающую среду, государственное регулирование отходов, выбросы отходов, выбросы парниковых отходов, правовое регулирование климатических изменений, снижение вреда окружающей среде, ответственность за нарушение норм в области обращения с отходами, система торговли квотами на выбросы, бесплатные квоты.

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