

**EFFECTIVENESS OF CLIMATE CHANGE PROTECTION PROGRAMS IN
KAZAKHSTAN AND CHINA**

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Annotation: Climate change gives rise to many problems for states that require immediate solutions. The solution of climate problems is especially difficult for countries that have a limited amount of resources and tools in this area. According to "Our World in Data" China is the leader in carbon dioxide emissions, has a significant impact on both the situation with global environmental problems and the world's energy markets. However, a low-carbon development policy may change the situation and China's attempts to create an "ecological civilization" may be quite successful. The study helped to conclude that China has now directed its development towards "green development" and the transition to the so-called renewable energy sources while reducing the share of fossil fuels in the energy mix. This will allow China to significantly reduce environmental pollution and reduce the energy intensity of the economy, improve the standard of living of the population, fulfill the obligations stipulated by the Paris climate agreement, improve national energy security, and realize its own innovation potential. Therefore, the conclusions on a comparative analysis of the climate change protection programs of Kazakhstan and China were provided in this article for further use in identifying the shortcomings of the domestic program. Moreover, topical problems associated with climate change and their impact are considered, as well as an assessment of the effectiveness of the implemented programs of the two countries.

Keywords: climate change, protection, programs, Kazakhstan, low-carbon development, China, ecological, civilization.

Basic provisions. According to calculations based on the ensemble of models of the World Meteorological Organization, the process of climate change on the territory of Kazakhstan will intensify in the 21st century. At the same time, climate change will occur very heterogeneously across seasons and territories. The average annual temperature will increase by 1-2 °C by 2030 and by 2-3 °C by 2050. The increase in precipitation by 2050 will not exceed 10%, mainly in the winter season, in the southwestern regions precipitation will be less than in the rest of Kazakhstan. Such changes in temperature and precipitation will inevitably lead to an imbalance in natural systems, a reduction in water resources, and, as a result, economic losses in agriculture and other sectors of the economy.

In order to prevent climate change in the Republic of Kazakhstan, it was decided to study China's climate change protection model, namely the low-carbon development strategy. Secretary of the G-20 Research Center Long Yuntu said that the development of the

low-carbon economy should be consistent and gradual, in accordance with the situation in the country, its continued development should be carried out under the condition of environmental protection and energy conservation. This condition is optimally suited for the Republic of Kazakhstan.

Introduction. Climate change refers to long-term changes in temperature and weather patterns. While these changes may be natural, such as solar cycling, since the 1800s, human activity has been a major driver of climate change, mainly through the burning of fossil fuels such as coal, oil, and gas. The past decade (2011-2020) has been the warmest on record.

While many people think that climate change means mostly warmer temperatures, rising temperatures are only the beginning of the story. Since the Earth is a system where everything is interconnected, changes in one area can affect changes in all others.

Currently, the impacts of climate change include severe droughts, water shortages, severe fires, sea level rise, floods, melting polar ice caps, catastrophic storms and loss of biodiversity, among others [1].

The following climatic problems exist in the Republic of Kazakhstan. With global warming of 2°C, agriculture in Kazakhstan will suffer, and the burden on the healthcare system will increase. By 2050, temperatures in Kazakhstan are expected to increase by 2–3°C, which will lead to a reduction in the period of precipitation and an increase in the period of prolonged heat. In addition, climate change affects the increase in temperature in the mountainous regions of Kazakhstan, which leads to increased melting of glaciers.

This means that in many mountain rivers, which are fed in summer, including by melting glaciers, in the future there will be water only in winter, while the snow melts. In the summer, there will be a shortage of water, and first of all for irrigation.

The lack of water in the mountain rivers became especially noticeable in June last year, when such stormy rivers as the Turgen, Charyn, Esik and Talgar turned into streams. Moreover, the water level in Ili, the main water artery of the Almaty region, has also significantly decreased, on which both the water level in Lake Balkhash and the capacity of the Kapchagai reservoir depend.

Meanwhile, according to UNDP calculations and the Committee on Water Resources, by 2050, under the influence of climate change, the flow of the Ural, Irtysh, Yesil, and Tobol rivers is expected to decrease. According to foreign researchers, by 2050 Kazakhstan may be on the list of catastrophic water stress states. Accordingly, in a changing climate, the need to revise the culture of farming is obvious [2].

This article also considers China. Climate change in China is having a major impact on the economy, society and the environment. China is the largest contributor to carbon dioxide emissions thanks to an energy infrastructure heavily reliant on fossil fuels and coal. In addition, other industries, such as the emerging construction industry and industrial manufacturing, are major contributors to carbon emissions. However, like other developing countries, on a per capita basis, China's carbon emissions were significantly lower than those of countries such as the US, ranking 51st in per capita terms as of 2016.

China is suffering from the negative effects of global warming on agriculture, forestry and water management, and its effects are expected to continue to grow. The Chinese government is taking some measures to increase the use of renewable energy and other decarbonization measures, promising to achieve zero carbon emissions by 2060 by adopting "more vigorous measures and policies" [3].

Description of materials and methods. Benchmarking methods were used to identify the effective and inefficient aspects of the Chinese low-carbon project and also the Kazakhstan "green economy" project. Consolidation analysis and also recommendations were involved in this article.

To determine the most "harmful" countries for the climate, data was used from Our World in Data, which helped determine that China ranks first in carbon emissions. The Report of the Working Groups I was also used, which is the first part of the sixth Report of the Assessors of the Intergroup Studies on Climate Research (IPCC AR6), to assess the current situation with the climate in the territory of the Republic of Kazakhstan.

As the main methods among general scientific methods, systemic and structural methods were broadly used.

Results. Combating climate change requires a long-term strategic approach. The climate policy of the Government of Kazakhstan is determined by the Paris Agreement, adopted in December 2015 by the parties to the United Nations Framework Convention on Climate Change (UNFCCC). Kazakhstan is fully committed to the obligations under the Paris Agreement, which provide guidelines for public policy to achieve the national target for greenhouse gas (GHG) emissions. By doing so, Kazakhstan shares the goals of the international community to keep the temperature of the Earth's atmosphere at a level no higher than 2°C compared to the pre-industrial level and even try to limit the temperature increase to no more than 1.5°C from the pre-industrial level. The Paris Agreement aims to avert the worst effects of climate change, which threaten the very foundations of the international economic system, food security and social cohesion. Inaction in response to coming climate change will undermine ambitions to achieve the seventeen global sustainable development goals (SDGs), which are set out in the United Nations 2030 agenda, adopted to mitigate international conflicts and migration flows, as well as prevent new ones. It is absolutely correct and worthy of respect that Kazakhstan recognizes itself as an active participant in this global movement [4].

The concept of transition to a "green economy" assumes that by 2030 55% of buildings will be built (that is, by 2030 more than half of Kazakhstan's buildings will be no older than 20 years), as well as 40% of power plants. In addition, by 2030, 80% of the vehicle fleet will be new. Assuming GDP growth of 4.3% per year, Kazakhstan will need to spend an average of \$292 billion (or 3.93% of GDP annually) on infrastructure until 2040. Compared to the current level of spending on infrastructure, this represents a total investment gap of US\$84 billion (1.11% of annual GDP). This gap is observed in infrastructure investment across all sectors of the national economy, but is more prevalent in cross-border infrastructure, energy and road transport.

Discussion. It is important to consider the climate strategies of the two countries. Let's start with the Republic of Kazakhstan. In 2020, our country published the Low-Carbon Development Strategy of the Republic of Kazakhstan: goals and ways of transformation. Within this program, Table 1 provides a (tentative) list of policies that could be applied across the economy, or at least across sectors [5].

Tab. 1- list of policies that could be applied across the economy, or at least across sectors.

	"Base"	"Green Economy"	"Zero GHG balance"
Emissions trading system (ETS)	The existing system will remain; the price level for GHG emissions will not change significantly	The system will expand with the entry of other enterprises; GHG prices will rise until 2030, then stabilize	Extended structure as in the Green Economy scenario, but emissions prices will continue to rise after 2035 until the end of the observed period
Emissions price (e.g. tax) for the rest of the economy outside the ETS	Do not apply to enterprises that are not included in the ETS; do not directly affect households	Broad involvement of all participants in the economic system by setting prices for GHG emissions for the economy as a whole	Strict monitoring and constant upward revision of the price of GHG emissions
Public investment	Existing programs and policies will be implemented	Revision of all programs and their refocusing according to the criteria for the impact of investments on emissions and energy costs	Attraction of additional investments from available budget revenues, domestic and international loans for the implementation of a large-scale investment program
Investment policy	Weak incentives to invest in energy efficiency	Proposal of an incentive package for investment in energy efficiency and reduced fuel consumption	Implementation of "cheap loans" and "tax holidays" programs to stimulate investment in low-carbon development projects and carbon sequestration
Source: [3]			

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What about Chinese climate policy? Given China's large contribution to global emissions, it is particularly significant that China ratified the Paris Agreement in 2016. This was a strong signal for other emerging economies. China NDC has the following components:

- GHG emissions should peak before 2030 or earlier;
- GHG emissions per unit of GDP until 2030 should be reduced by 60-65% compared to the level of 2005;
- by 2030, the share of non-fossil sources in the total volume of primary energy sources should reach 20%;
- by 2030, the volume of the country's forest fund should be increased by 4.5 billion m³ compared to the volume of 2005.

At the moment, the main obstacles to accelerated progress are the partial return to operation of coal-fired power plants (after a two-year ban) and the reduction in 2019 of subsidies for wind and solar energy. In fact, China's high coal consumption is one of the biggest problems: coal generates about two-thirds of China's electricity, and in 2018 alone, the country increased coal-fired capacity by 43 gigawatts. This development is contrary to the goals of the Paris Agreement, the achievement of which would require the almost complete elimination of coal energy production [5].

However, an Emissions Trading Scheme (ETS) is currently being set up in China: the ETS is due to come online in 2020, initially covering only electricity generation. China's emissions trading initiatives are in line with the Memorandum of Understanding with the European Commission to enhance dialogue and cooperation on climate change (signed in 2018). The Parties intend, in particular, to explore the possibilities of comprehensive cooperation in solving problems arising in connection with trading in emission quotas and the prospects for the development of international carbon markets. In addition, China plans to set up a domestic renewable energy certification system based on targets set for each province.

The great economic power of China makes us think not only about domestic efforts to reduce emissions, but also about the potential impact on GHG emissions beyond its borders. The country finances and builds energy supply facilities around the world, including renewable and traditional energy sources. In particular, China indirectly influences global emissions by financing energy projects through its two global policy banks, the China Development Bank and the China Export-Import Bank.

Conclusion. In conclusion, conclusions can be drawn on the effectiveness of the Chinese climate policy. Xi Jinping told other world leaders attending the summit (Climate Summit of Heads of State) that his country is already taking concrete action. "China has included this goal in the process of building an ecological civilization, and an action plan is currently being implemented to achieve the peak of carbon emissions by 2030."

"During the 14th Five Year Plan (from 2021 to 2025), we will strictly control the growth of coal consumption and gradually limit its consumption throughout the 15th Five Year Plan."

Coal power remains one of the largest energy sources in China, and in 2021 the country has pledged to bring the share of coal in total energy consumption to below 56%.

According to the 14th Five-Year Plan, one of the key policy documents that will have a significant impact on the economic development of the country over the next decade and beyond, energy consumption per unit of gross domestic product (GDP) and carbon dioxide emissions per unit of GDP will be reduced over this period by 13.5 and 18%, respectively [6].

As for Kazakhstan. Growing multibillion-dollar investments in environmental protection in Kazakhstan do not appear to be helping to improve the environment. According to the CCPI (Climate Change Performance Index) 2022 ranking, the country scored the lowest, 19.81. Nine positions lower than last year. Kazakhstan's rating turned out to be very low in all four categories. Thus, in the category of greenhouse gas emissions, Kazakhstan took 63rd place out of 64. Kazakhstan also took 63rd place in the category of energy use. In the category of renewable energy, our country ranks 59th, and in the category of climate policy - 54th.

Therefore, these works should continue. As part of the measures taken, political efforts should be directed to the following:

- increased planting of trees, i.e. increase forest cover, for example, in broadleaf and coniferous forests;
- promoting low-carbon farming practices, such as controlled-emission fertilization, including natural fertilizers, improved efficiency and improved fertilizer selection;
- encouragement of cultivation of bioenergy crops, expansion of crops of energy crops;
- reducing food waste and consumption of the most carbon-intensive products, such as beef, lamb and dairy products;
- improved handling of animal by-products [7].

Now there are a lot of approaches that are proving to be successful – how this can be implemented at the local level, at the national level – that is, such discussions are underway. And we would very much like this to become a big topic for Kazakhstan as well, because Kazakhstan is a country that is very vulnerable to climate change. We know that the melting of glaciers in Central Asia will greatly affect the availability of water resources, especially for those regions that depend on the flow of mountain rivers. That is, we are very vulnerable, but, on the other hand, we are a country that emits greenhouse gases and we have a very carbon-intensive economy.

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ҚАЗАҚСТАНДА ЖӘНЕ ҚЫТАЙДА КЛИМАТТЫҢ ӨЗГЕРІСІН ҚОРҒАУ БАҒДАРЛАМАЛАРЫНЫҢ ТИІМДІЛІГІ

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Аңдатпа: Климаттың өзгеруі мемлекеттер үшін шұғыл шешімдерді қажет ететін көптеген проблемаларды тудырады. Климаттық проблемаларды шешу әсіресе осы саладағы ресурстары мен құралдары шектеулі елдер үшін қиын. «Our World in Data» деректері бойынша Қытай көмірқышқыл газының шығарындылары бойынша көшбасшы болып табылады, жаһандық экологиялық проблемаларға да, әлемдік энергетикалық нарықтарға да айтарлықтай әсер етеді. Дегенмен, төмен көміртекті даму саясаты жағдайды өзгертуі мүмкін және Қытайдың «экологиялық өркениет» құру әрекеті айтарлықтай сәтті болуы мүмкін. Зерттеу Қытай енді өз дамуын «жасыл дамуға» және энергия қоспасындағы қазбалы отынның үлесін азайта отырып, жаңартылатын энергия көздері деп аталатындарға көшуге бағыттады деген қорытынды жасауға көмектесті. Бұл Қытайға қоршаған ортаның ластануын айтарлықтай азайтуға және экономиканың энергия сыйымдылығын азайтуға, халықтың өмір сүру деңгейін жақсартуға, Париж климаттық келісімінде көзделген міндеттемелерді орындауға, ұлттық энергетикалық қауіпсіздікті жақсартуға және өзінің инновациялық әлеуетін жүзеге асыруға мүмкіндік береді. Сондықтан отандық бағдарламаның кемшіліктерін анықтауда одан әрі пайдалану үшін осы мақалада

Қазақстан мен Қытайдың климаттың өзгеруінен қорғау бағдарламаларын салыстырмалы талдау бойынша қорытындылар берілді. Сонымен қатар, климаттың өзгеруіне байланысты өзекті мәселелер мен олардың әсері қарастырылып, екі елдің іске асырылып жатқан бағдарламаларының тиімділігіне баға беріледі.

Тірек сөздер: климаттың өзгеруі, қорғау, бағдарламалар, Қазақстан, төмен көміртекті даму, Қытай, экологиялық, өркениет.

ЭФФЕКТИВНОСТЬ ПРОГРАММ ПО ЗАЩИТЕ ИЗМЕНЕНИЯ КЛИМАТА В КАЗАХСТАНЕ И В КИТАЕ

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Аннотация: Изменения в климате порождают множество проблем для государств, которые требуют немедленного решения. Особые сложности решение климатических проблем представляются для стран имеющих ограниченный объем ресурсов и инструментов в этой области. По данным «Our World in Data» Китай является лидером по выбросам углекислого газа, оказывает существенное влияние как на ситуацию с глобальными экологическими проблемами, так и на мировые энергетические рынки. Однако, политика низкоуглеродного развития может поменять ситуацию и попытки Китая создать "экологическую цивилизацию" могут быть вполне успешны. Исследование помогло сделать выводы, что сейчас Китай направил свое развитие в сторону "зеленого развития" и к переходу к так называемым возобновляемым источниками энергии при сокращении доли ископаемых видов топлива в энергобалансе. Это даст Китаю очень ощутимо снизить загрязнение окружающей среды и снизить энергоемкость экономики, повысить уровень жизни населения, выполнить обязательства, предусмотренные Парижским соглашением по климату, повысить национальную энергобезопасность, реализовать собственный инновационный потенциал. Поэтому выводы по сравнительному анализу программ по защите изменения климата Казахстана и Китая были предоставлены в данной статье, для дальнейшего использования по выявлению недостатков отечественной программы. Более того, рассмотрены актуальные проблемы, связанные с климатическими изменениями и их влияние, а также дана оценка эффективности внедряемых программ двух стран.

Ключевые слова: изменение климата, защита, программы, Казахстан, низкоуглеродное развитие, Китай, экологический, цивилизация.

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