

STATE REGULATION OF ECO-INNOVATION: WORLD EXPERIENCE ANALYSIS

REGULAÇÃO ESTATAL DA ECOINOVAÇÃO: ANÁLISE DA EXPERIÊNCIA MUNDIAL

REGULACIÓN ESTATAL DE LA ECOINNOVACIÓN: ANÁLISIS DE LA EXPERIENCIA MUNDIAL

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Abstract. Today it is becoming more and more obvious that the quality of life of the population of different regions of the country largely depends on the state of the environment. Consequently, the management of the state of environmental quality indirectly entails the management of the quality of human life. In such conditions, the introduction of quality management systems and environmental management systems is gradually becoming economically profitable. Over the past decades, the relationship between society and the environment has become increasingly strain, becoming a real threat of a global environmental catastrophe. To prevent global and local environmental crises, it is necessary to change the technogenic type of development to a sustainable one. This type of development allows us to meet the current needs of society, but does not jeopardize the ability of future generations to meet their own needs. The purpose of the study is to show the relevance and necessity of introducing the innovative development of the economy of nature management and the "green economy" into practice, and to develop the principles of effective state participation in the innovation sphere in the countries of the European Union by the methods of state regulation, as well as the possibility of applying this experience in the Republic of Kazakhstan.

Keywords: Sustainable development, eco-innovation, green growth, product innovation, green bridge, green economy.

Resumo. Atualmente, torna-se cada vez mais evidente que a qualidade de vida da população de diferentes regiões do país depende, em grande medida, do estado do meio ambiente. Consequentemente, a gestão da qualidade ambiental implica, indiretamente, a gestão da qualidade de vida humana. Nesse contexto, a implementação de sistemas de gestão de qualidade e gestão ambiental está gradualmente se tornando economicamente viável. Nas últimas décadas, a relação entre a sociedade e o meio ambiente tem se tornado cada vez mais tensa, representando uma ameaça real de uma catástrofe ambiental global. Para prevenir crises ambientais globais e locais, é necessário substituir o modelo de desenvolvimento tecnogênico por um modelo sustentável. Esse tipo de desenvolvimento permite atender às necessidades



atuais da sociedade sem comprometer a capacidade das gerações futuras de satisfazerem suas próprias necessidades. O objetivo deste estudo é demonstrar a relevância e a necessidade de integrar o desenvolvimento inovador da economia de gestão ambiental e da "economia verde" na prática, além de desenvolver princípios para a participação estatal eficaz na esfera da inovação nos países da União Europeia, utilizando métodos de regulação estatal. O estudo também explora a possibilidade de aplicar essa experiência na República do Cazaquistão.

Palavras-chave: Desenvolvimento sustentável,ecoinovação, crescimento verde, inovação de produtos, ponte verde, economia verde.

Resumen. En la actualidad, resulta cada vez más evidente que la calidad de vida de la población de las distintas regiones del país depende en gran medida del estado del medio ambiente. Por consiguiente, la gestión del estado de la calidad ambiental implica indirectamente la gestión de la calidad de la vida humana. En tales condiciones, la introducción de sistemas de gestión de la calidad y de los sistemas de gestión ambiental se está volviendo poco a poco económicamente rentable. En las últimas décadas, la relación entre la sociedad y el medio ambiente se ha vuelto cada vez más tensa, convirtiéndose en una amenaza real de una catástrofe ambiental global. Para prevenir las crisis ambientales globales y locales, es necesario cambiar el tipo de desarrollo tecnogénico por uno sostenible. Este tipo de desarrollo nos permite satisfacer las necesidades actuales de la sociedad, pero no pone en peligro la capacidad de las generaciones futuras para satisfacer sus propias necesidades. El objetivo del estudio es mostrar la pertinencia y la necesidad de introducir en la práctica el desarrollo innovador de la economía de gestión de la naturaleza y la "economía verde", y desarrollar los principios de la participación estatal efectiva en la esfera de la innovación en los países de la Unión Europea mediante los métodos de regulación estatal, así como la posibilidad de aplicar esta experiencia en la República de Kazajstán.

Palabras-clave: Desarrollo sostenible,ecoinnovación, crecimiento verde, innovación de productos, puente verde, economía verde.

1. INTRODUCTION

World experience shows that the formation of an innovative economy can be carried out both using mainly market mechanisms (Korableva et al., 2020), as happened, for example, in the United States, and on the basis of a system of state regulation, which has become widespread in the EU countries. The weak level of development of market institutions due to the too short period of their existence in the Republic of Kazakhstan practically does not leave the possibility of choosing a way to build an innovative economy in the country. Thus, state regulation becomes a critical factor in the period of transformation of the domestic economy, and a promising one in the future (Dmitrieva et al., 2017; Vaslavskaya et al., 2023; Korableva et al., 2023; Medvedeva & Mitina, 2021; Hexmoor & Maghsoudlou, 2024).

The research plan is based on the experience of the EU countries, where the state innovation policy has helped to overcome the weak level of development of national innovation systems in a relatively short time and become a world leader in the field of innovation. At the same time, it should be note that the experience of state and supranational regulation of innovation activities in the EU member states, as well as the possibility of its use in the Republic of Kazakhstan, is not fully studied.

A well-thought-out state policy at this stage of our country's development can activate sluggish current innovation processes and increase the competitiveness of domestic industry. In connection with the above, the topic of this study is extremely relevant.

Originality/value-the concepts of "innovation", "economic mechanism", "green economy", "innovative economy", "sustainable development" as an innovative economic tool and as a new direction in the economic science of Kazakhstan are considered. The research corresponds to the priorities of scientific, scientific-technical and socio-economic development of the Republic of Kazakhstan.



However, today scientists have not formulated a single and unambiguous idea about the essence of the concept of eco-innovation, so it is necessary to further study and improve it.

Scientists give a deep theoretical study of the essence of the category of environmental innovations (Golovina et al., 2023; Yakovleva et al., 2023; Chetthamrongchai et al., 2022; Adedokun & Oyetunde-Joshua, 2024). The researcher defines the basic categories of the theory of innovation, in particular, the ratio of the categories "innovation-innovation-innovation". Innovation is considered as the production of the new, the category "innovation" is interpreted as a "new sample", and "innovation" - as production development.

Like any other change, eco-innovation has its own driving and restraining forces (Rakhimov et al., 2024; Gabdulkhakov et al., 2021; Pogosyan, 2021; Ram et al., 2024). Under the conditions of ecological globalization, society becomes more sensitive to the issues of preserving the quality of the environment (Egorov et al., 2023; Dube et al., 2023; Saenko et al., 2019; Yemelyanov et al., 2018, 2019, 2020; Gradoboev & Tesleva, 2017; Kilinc et al., 2018; Panova et al., 2023), so we can hope that the public interest, the process of rethinking values, the legal and regulatory environment will create the appropriate ground for the accelerated deployment of processes for taking into account environmental restrictions in all spheres of public life (Horbach, 2008; Nainggolan et al., 2024; Rahmani et al., 2022).

Slovenia is a good example of the impact of eco-innovation practices on the real sector. The country has achieved notable success in the development of an innovative economy (Arifin, 2021), has a favorable business climate, the mentality of the population is characterized by a high ecological culture, which allows us to consider this state as a relevant platform for research. The existing business opportunities here are perceived more and more positively, entrepreneurs have a significant social status, as evidenced by Slovenia's high position in the ranking of social values of entrepreneurship (22nd place out of 60 surveyed countries) (GEM, 2016).

The country ranks 15th out of 139 in terms of environmental performance, 12th out of 138 in terms of the number of ISO14001 environmental certificates issued, and 28th out of 141 in the Global Innovation Index (Kiki et al., 2023). Thus, innovation, including eco-innovation, is an integral part of the development and competitiveness strategies of Slovenian companies (Adalikwu, 2011). The term "eco-innovation" is used in the modern scientific literature relatively recently.

2. MATERIALS AND METHODS

Methodology-the study used such methods as analysis of the causes and consequences of the problem under consideration, systematic, statistical, computational and analytical methods, monitoring, and methods of economic and statistical analysis, grouping, comparison, and expert assessments.

The theoretical and methodological basis of the research is fundamental works, monographs, scientific articles of foreign and domestic scientists on the issues of modern scientific and technical development of society, mechanisms of technological development of the economy and financing of innovative processes in the Republic of Kazakhstan.

3. RESULTS

By supporting new processes, technologies, and services that make businesses greener, eco-innovation helps Europe optimize its growth potential while addressing our common challenges, such as climate change, resource scarcity, and declining biodiversity. Eco-innovation represents a key opportunity to assert Europe's leadership role in overcoming global sustainability challenges, while making Europe's economy even stronger and more competitive. The global market for environmental goods and services is growing.



Food 2030 provides the policy framework to accelerate this transition within secure planetary boundaries. This is in line with and supports the objectives of the European Environmental Strategy, the farm-to-fork strategy and the bioeconomy strategy.

The socio-economic outcomes of eco-innovation reflect the broader implications of eco-innovation for society and the economy. This includes changes in employment, turnover, or exports that may be related to broadly understood eco-innovation activities.

Exports of environmental products (percentage of total exports), Employment in environmental protection and resource management (percentage of labor force), Value added in environmental protection and resource management (percentage of GDP).

In this Brief, you can see the overview of the trends across EU28 shown by the 2019 Index. For an overview of the EU Average's evolution across the years, please refer to EIO Brief 2018.

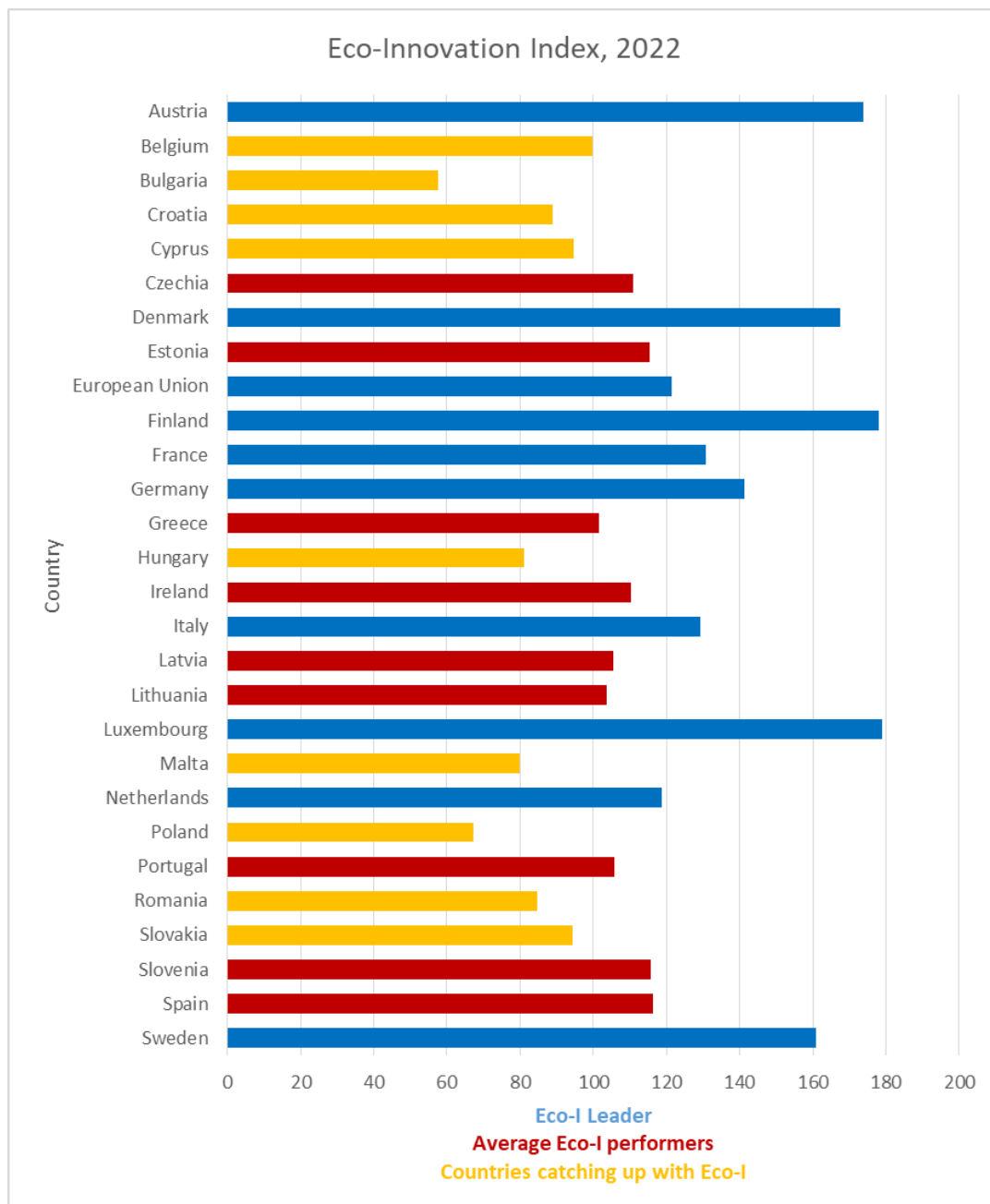


Figure 1. Eco-innovations of the EU member states for 2022 (EU average of 100)

Digitalization is taking place at a rapid pace in all European countries and is transforming the economy, society, forms of communication, workplaces and the necessary skills in the workplace and in everyday life. The Covid-19 pandemic is also accelerating digitalization on many levels. The resulting major challenges are being addressed by a number of recently adopted European policies that are closely linked to digitalization and the transition to an innovative and sustainable society.

In 2019, the European Commission adopted the European Green Deal, a long-term strategy for a sustainable Europe. The Economy Action Plan New Circular, the Biodiversity Conservation Strategy 2030 and the Zero Pollution Action Plan are three important initiatives under the Green Deal. Vision - a digital and sustainable society. Thus, various strategies and action plans make up a large portfolio of measures, tools and milestones that are always associated with digital technologies. At best, they are eco-friendly and sustainable.

4. DISCUSSION

Based on the conducted research, it is revealed that taking into account the world experience, the use of the economic mechanism of nature management, the introduction of environmentally friendly "green" technologies is promising. In the context of global problems of energy saving, it is relevant for Kazakhstan to develop a sound national strategy for sustainable development, taking into account the main provisions of international declarations on the transition to a "green" economy. The formation of the economic mechanism of sustainable development in each country takes into account its own, unique regional natural conditions, which are characterized by a number of interrelated and mutually dependent problems.

Over the past decades, the Republic of Kazakhstan has been actively moving towards overcoming the socio-ecological and economic crisis, with the goal of sustainable ecological and economic development and inclusion in the current system of world economic interactions (Mityakov, & Kulikova, 2024). All this is important for the modernization of the country and its successful joining in the system of global innovative development, the transition from the "brown-raw materials" economy to the "green-non-raw materials" economy. In accordance with this, the current economic development of Kazakhstan is focused on the innovative path and the gradual overcoming of the export-raw materials orientation of its economy.

Taking into account all the complexities of ecological processes in the biosphere, in the system "man-society-nature", it is necessary to take into account the maximum number of factors, features, conditions, and for sure this will help to optimize the process of rational, effective use of natural resources, as well as to minimize the harmful impact on the environment.

The idea of innovation in the efficient use of natural resources as the basis of ecological and economic development and the maintenance of balance in nature and quality of living conditions is derived from the definition of innovation given in the international standards on statistics, science and technology:

"Innovation is the final result of investment activity that has been transformed into a new or improved product on the market, and a new or improved technological process used in real activities in practice, as well as a new approach to social services". (Medeiros, 2014). Currently, the ongoing processes in the world economic space indicate an acute crisis of the current development model.

The traditional industrial economy, as a result of the depletion of vital resources and the dangerous pollution of the environment, threatening the world with an ecological catastrophe, has come to a state of extreme instability. This led to the proclamation of the concept of sustainable development as the main idea of the current modern development of the world



economy, which is enshrined in the resolutions of international conferences and forums ("Agenda for the XXI Century", proclaimed by the UN Conference on Environment and Development in Rio de Janeiro, 1992, the results of the UN World Conference on Sustainable Development in Johannesburg, 2002, and a list of other intergovernmental documents and conventions).

The construction of the mechanism of economically sustainable development in each state takes into account the individual, unique regional natural conditions, which are characterized by a number of interdependent problems, the main of which are:

environmental problems in the management and organization of cost-effective effective use of natural resources, while taking into account measures for the protection and reproduction of the natural environment; socio-economic issues related to the quality of living standards and established traditions of the population, the introduction of labor resources; the issue of improving the sectoral and territorial structure of state management, which meets the current reasonable needs of the innovative economy.

At the same time, the ecological and economic mechanism of environmental management and environmental protection in the Republic of Kazakhstan has not yet been sufficiently developed in relation to its connection with the strategy of innovative development; therefore, the economic situation in the country does not meet the requirements of environmentally safe and resource-saving development (Upushev, 2013).

Despite the fact that a lot of scientific research has been accumulated and there is a scientific reserve both in the field of effective nature management and ecology, and in the field of building a mechanism for the economy of innovative development, it should be noted that they have never been considered in close relationship. The reason for this is that the problem of establishing an effective mechanism for economical use of natural resources in the context of innovative development is an actual theoretical and methodological problem that needs to be solved immediately (Nainggolan et al., 2024).

Today, Kazakhstan, with its opportunities for economic growth, favorable geographical location, and of course huge natural resources, is faced with the question of achieving sustainable development and growth for many years, it is aggravated by the fact that by focusing the country's efforts on the use of mineral resources, the Republic of Kazakhstan emits the largest amount of greenhouse gases among the CIS countries.

Kazakhstan has huge reserves of energy resources, while using coal we get about 43% of energy, 39% - from gas, 17% - from oil, and the share of non-traditional energy sources accounts for 0.2%.

The conference, which was held from 20 to 22 June 2012 in the Brazilian city of Rio de Janeiro, adopted the most important declaration "The Future we want", which included recommendations for the transition to a "green economy" as a new approach to global environmental development. The issues of transition to a "green" economy in conjunction with sustainable environmental development and reducing the consequences of poverty and hunger were also discussed here.

According to the results of the forum, the researchers called for the adoption of the "Declaration on the Development of Renewable Energy in Developed and Developing Countries" to be included in the agenda of the World Summit on Sustainable Development "Rio+20", as it is one of the most important measures for the implementation of the "Global Energy Economic Strategy". In addition, the recommendation proposals note that the decision to create a green fund for climate issues, adopted in December 2010 in Mexico (Cancun), should receive the prerequisites for the creation of a "World Energy and Environmental Bank".

"Green economy" means an economy with a sufficient level of quality of life of the population, economical and rational use of natural resources to meet the needs of today's and future generations and in accordance with the country's international environmental rights and



obligations, including in accordance with the Rio Principles, the Agenda for the XXI Century. The most important outcome document of RIO+20 reflects the interregional initiative of Kazakhstan "Green Bridge Partnership Program", which is voluntary and open for cooperation of all countries. The initiative of Astana "Green Bridge" was previously supported at the VI Ministerial Conference of the countries of the Asia-Pacific region and the VII Pan-European Conference "Environment for Europe" (September 2010 and 2011 in Astana).

An important goal of the Astana Initiative is to develop cooperation on the development of plans for the transition from stereotypical models of the economy to the concepts of sustainable "green" development, including low-carbon development and adaptation to climate change, the promotion of "green business" and green technologies, sustainable urban development, the promotion of sustainable lifestyles and improving the quality of life (Nagorny, 2013).

Among the most important areas of the "Green Bridge Partnership Program" is to increase the eco-efficiency of the use of natural resources and investments

Today, the green economy is one of the priority tools for ensuring the country's sustainable development. The transition to a "green economy" can help to achieve the goal of Kazakhstan becoming one of the 30 most developed countries in the world.

The availability and efficiency of clean technologies continues to be a key aspect of the global transition to a resource-efficient, resource-efficient green economy. In particular, the improvement of outdated technologies and their replacement with modern sustainable alternatives can significantly improve human health, affect the economical spending of funds, create jobs and, of course, have a positive impact on the state of the natural environment.

UNEP in 2009, with the aim of finding solutions to the problem of climate warming and improving the management of industrial and household waste and chemicals in cooperation with UN organizations, agencies of environmental conventions,

The concept of a "green non-resource economy" is gaining more and more popularity and, of course, causes active discussions. At the same time, there are fears that the orientation to the new economic model will reduce the opportunities for growth and prevent the solution of social problems.

Towards a green economy: the path to sustainable development and the eradication of poverty "indicates that there should be no such doubts. On the contrary, the "green economy" encourages innovative ecological and economic progress and creates jobs, in addition, reduces the negative effects of climate warming, water depletion and reduced environmental services.

According to some expert studies, in the near future, the "green economy" can provide growth in per capita income and employment, increase in gross domestic product at a higher rate than the "brown" established economy. Therefore, in the long-term future, the "green economy" will outgrow the "brown" one and, in addition, will allow for the reorientation to the "green economy", it is important in 2012-2050. Invest only about 2% of the world's gross domestic product in nine key sectors: waste management and recycling, water management, agriculture and housing, energy, fisheries, forestry, industry, tourism and transport. The researchers of the report believe that these funds can be attracted by using innovative mechanisms for allocating funds and implementing effective public administration.

The resources that are needed additionally can be obtained by eliminating subsidies in the energy sector, water and agriculture and fisheries. The total amount of subsidies for the consumption and production of fossil fuels has exceeded \$ 680 billion, which does not allow for greater use of alternative energy sources (Pagiola, 2004).

The researchers suggest that in the next 60 years, the global use of oil will increase by more than 2.5 times, natural gas by 3 times, and other types of mineral raw materials by 4 times. That is why the transition to the consumption of non-traditional sources is becoming very relevant. In order to prevent an environmental disaster, scientists have estimated that by the end of the XXI century, the share of solar energy should be at least 60-70%. In the prospects of the



European Commission, the share of energy in Europe by 2020, which is obtained from alternative sources, should be increased to 25-30%. The development of alternative energy is also a priority for Kazakhstan. Today's economic model of Kazakhstan is called the "brown raw material economy", which has the following features:

Dependence of the economy on the oil sector, mining and heavy industry. The oil sector accounts for 30-35% of the national gross domestic product and about 60-65% of Kazakhstan's exports. The foundations of growth are based on the massive use of energy and natural resources, making Kazakhstan the twelfth most energy-intensive country in the world. Due to the relevance of sustainable development in the developed countries of Europe, East Asia and North America, Kazakhstan's exports face more complex issues related to the implementation of environmental standards. Dependence on extractive industries reduces opportunities for innovative development in other processing sectors.

The urgent task of the Republic of Kazakhstan is the transition from the "brown raw materials economy" to the "green non-raw materials economy", which was discussed in the President's Address to the people of Kazakhstan in the new Strategy "Kazakhstan-2050": a new political course of the established state". It sets clear goals for building a sustainable and efficient model of the economy, for the country's transition to a "green, ecological" path of development. In this regard, the Concept for the transition of the Republic of Kazakhstan to a "green economy" was approved (Decree of the President of the Republic of Kazakhstan No. 557 of May 30, 2013).

The reasons for the transition to a "green economy" can be considered as follows:

1. Shortcomings in the system of tariff pricing for energy resources do not provide motivation and incentive for technological improvement of production and industry.
2. In almost all the main sectors of the Republic of Kazakhstan, you can see the irrational use of resources. According to scientists, this can lead to a loss of profit of 5-8 billion US dollars per year for the economy, and by 2030 it can reach up to 14-15 billion US dollars. Given that, the potential for energy savings is US \$ 3-4 billion per year, and by 2030 this figure could grow to US \$ 6-10 billion per year.

As a result of low land productivity, economic losses amount to 1.5-4 billion US dollars per year, and by 2030 they may become even greater, which can have huge socio-economic consequences for the agricultural sector, where a considerable number of people (about 30-45%) are employed, mainly in such areas as North Kazakhstan, Almaty, and South Kazakhstan.

At the moment, our country is faced with the problem of a very strong deterioration of the environment and the state of natural resources in all the most important environmental indicators (Sabitova, 2017).

The current forecast is for a shortage of sustainable water resources to meet the needs of the economy by 2030, for 13-14 billion meters. More than half of the agricultural land is now degraded or threatened by desertification, and more than 10 million hectares of potentially arable land are abandoned.

Of course, environmental pollution has a serious negative impact on people's health. According to international studies, about 40 thousand children under 10 years of age have neurological disorders because of exposure to lead above the norm. Kazakhstan ranks second in terms of total environmental pollution from organic substances among the countries of Central Asia and Eastern and Central Europe.

Thus, the transition to a non-resource economy, as well as the adoption of First, in the coming decades, Kazakhstan's infrastructure will be significantly updated: 55% of buildings and 40% of power plants from the total volume of these assets will be built from scratch by 2030. In addition, more than 80% of the vehicle fleet will be new by 2030. Kazakhstan has a

unique opportunity to create a new infrastructure that uses resources efficiently. If this does not happen, the state may soon face the problem of uncompetitive and outdated infrastructure.

Secondly, the profitability and competitiveness of "green" technologies is growing rapidly, and many non-traditional energy technologies will offer minimized cost-effective methods of electricity production in the near future.

Third, a high level of transformation in the sphere of state management policy has already been set. The Strategy-2050 and other strategic project documents set ambitious goals:

- for water resources, the task is to solve the problems of providing drinking water to the population by 2020 and providing water to agriculture by 2040;
- in agriculture, the task is to increase the productivity of agricultural land by 2 times by 2020; in the electric power industry: the share of alternative and renewable electricity should reach at least 50% by 2050;
- in energy efficiency, the task is to reduce the energy intensity of GDP by 10% by 2015 and by 25% by 2020 compared to the baseline level of 2008.

By 2030, the country will be able to restore water and land resources and largely match the average indicators of the efficiency of the use of natural capital with the member countries of the Organization for Economic Cooperation and Development and other developed countries, if we achieve the goals set above, which will require a significant change in the existing trajectory of the economy of Kazakhstan.

In this regard, the implementation of the concept for the transition of the Republic of Kazakhstan to a "green economy" is divided into three stages:

- The main most important tasks for the transition to a "green non-resource economy" that we face are: improving the well-being of the population and the quality of the environment through cost-effective ways to mitigate pressure on the environment;
- Improving national security, including on Trans boundary water resources;
- Improving the rational use and management of resources (water, land, biological, etc.); modernizing existing and building new infrastructure.

Renewal in the resource sectors of the economy takes a long time, and in countries where the economy is focused on the extraction of mineral resources, the transition to an environmentally friendly economy takes decades. Kazakhstan, as a raw material country, is no exception.

The period from 2020 to 2030– based on the created "green" infrastructure, the national economy will be transformed, focused on the careful use of water, stimulating the development of renewable energy, as well as the construction of buildings and structures based on energy-efficient standards. The period from 2030 to 2050.

5. CONCLUSION

The main vector of modern global competition is located in the field of dynamically changing advantages based on scientific and technological achievements and innovations. The experience of the EU countries shows that a number of institutional conditions, the most significant of which is the formation and functioning of the national innovation system (Vakhromov, 2014), ensures competitiveness.

The state plays an active role in the formation and functioning of the national innovation system in its regulatory, organizational and resource support. At the same time, as the innovation economy develops, the state should make the transition from direct management to indicative management.



Thus, Kazakhstan, with its huge natural resources, favorable geographical location and opportunities for economic growth, faces the question of innovative development of the natural resource economy. Taking into account the fact that the country is focused on oil and coal energy, the most important direction of the republic's development is the innovative development of the natural resource economy and the prospects for Kazakhstan's transition to a "green economy".

Consequently, the formation of a single environmentally oriented management system and the widespread use of financial and economic mechanisms for sustainable development involves the introduction of differentiated rent taxation, special rules for the taxation of certain types of production, the collection of fines and payments for pollution, tax incentives for investments in fixed assets for environmental purposes, the auction sale of rights to pollution that harm the environment in the processes of production and consumption.

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