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## «Green economy» as a way of future development of Kazakhstan

In the article theoretical aspects of realization of the concept of «green economy» in the Republic of Kazakhstan are considered. The essence, content and basic principles of the «green economy» as a basis for stimulating the sustainable development of the national economy are defined. The key achievements of the «green economy» are considered: creation of «green» workplaces, creation of new «green» industrial branches, increase of high-tech workplaces, creation of ecological sustainable economy and beverage social development. Authors studied the potential problems of transformation of the Republic of Kazakhstan to a new «green» course of economic development. The conditions and tools for the transition to a green economy that will lead to the emergence of new economic opportunities are formulated. On the basis of the received results the characteristic and suggestions on improvement of ecological and economic policy in the Republic are given. The specific measures to reduce the costs of production of alternative energy sources are introduced.

*Keywords:* «green economy», ecology, ecological crisis, waste, alternative energy sources, state support instruments.

Now many treatments of «green economy» take place. All of them are close to the fact that the «green economy» is the economy directed to maintaining wellbeing of society, due to effective use of natural resources and also providing return of products of final use to a production cycle.

At the heart of green economy — clean or «green» technologies. According to experts, development of «green economy» will allow to avoid to Kazakhstan of ecological crisis which has affected by the scales already many post-industrial countries [1]. Figure 1 below shows a diagram of the green economy in relation to waste management.

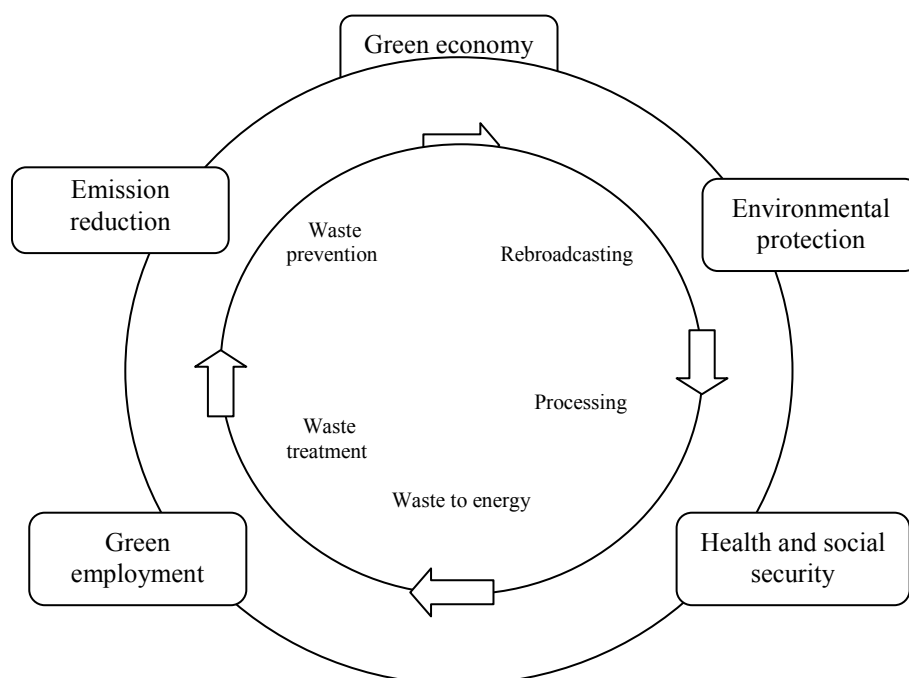


Figure 1. Green economy and its waste management

The need to develop a «green economy» should be considered both in the geopolitical and national aspects of security. Today, in the media quite often began to say that some countries of the former Soviet Union are considered by Western civilization and not only as «reserve territories» for living and business. At

the same time, it is possible to predict various alternative options, for example, the global warming scenario, which will provoke the melting of glaciers and the flooding of Western Europe and America. This can lead to their food security, and then under the pretext «you have huge free territories, you have great resources, but you cannot rationally use them, destroy forests, etc.» «our partners» will try to put national elite under control and to carry out expansion.

According to experts, the axis of the Earth tends to shift, and this leads to a cooling or warming of certain territories, depending on the direction of its shift relative to the axis of the ecliptic. According to this theory, the Atlantic has already been frozen several times, and the glaciations of certain regions of Eastern Siberia has proceeded according to this scenario. The cooling of the Atlantic also happened when the waters of the Labrador Current «crushed» the Gulf Stream at the point of «diving», and nowadays this can be done due to a powerful explosion.

In addition, a new era of the resettlement of peoples from certain regions of Africa and the Middle East in the form of «climate refugees» is possible. This is due to their high fertility and unsuitable climate for living [2].

Therefore, the implementation process of the «green economy» strategy should be considered from the standpoint of national security in order to protect oneself from any expansion, while enhancing the ecological culture and well-being of the people. The «green economy» as one of direction in economic science, was formulated in the last two decades. At the same time three basic principles have been developed:

- a) it is impossible to expand infinitely a sphere of influence in space;
- b) it is impossible to demand satisfaction of infinitely growing needs of mankind in the conditions of limitation of resources;
- c) everything on the Earth surface is interconnected and interdependent [3].

The main task of «green economy» is directed to reduction of consumption of those resources which are subject to exhaustion now (minerals — oil, gas, ore, etc.) and their rational use. It should be noted that energy saving and energy efficiency aren't the only key factors of «green economy». Actually key factors of development of «green» power along with energy saving and energy efficiency are the renewable power, reduction, reuse and processing of waste and also application of more eco-friendly methods of managing in agriculture.

Results of the Third industrial revolution in the world can promote development of «green economy» in Kazakhstan. Among its basic canons there is a transition to renewable sources of natural resources, introduction of energy efficient technologies and others.

Historical and legal aspects of strategy «green economy» in RK have been partially already considered by us in work [4], continuing, it is necessary to stop that this Concept includes three stages:

1) till 2020 — to optimize the use of natural wealth and to create energy efficient infrastructure. Set of goals:

- 100 % water supply for all agriculture;
- elimination of the deficit for each water basin;
- reduction of the energy intensity of GDP by 30 % compared with 2008;
- increase of the share of alternative energy sources to 30 %;
- transfer in major cities of thermal power plants to gas — up to 25 % of the total number of thermal power plants;
- reduction of carbon dioxide emissions by 15 % compared to 2012;
- ensuring of the removal of solid household waste from the population by 100 %;
- increase in the share of waste processing to 40 %;

2) until 2030 — on the basis of the established infrastructure, transform the national economy of Kazakhstan.

3) until 2050, a national economic model should be built in accordance with the principles of global industrialization. Natural resources should be used only if the conditions for their renewal are met. Set of goals:

- elimination of water supply problems in the country;
- reduction of energy intensity of GDP by 50 % compared to 2008;
- increase of the share of alternative energy sources to 50 %;

– reduction of carbon dioxide emissions by 40 % compared to 2012 and an increase in the share of waste processing.

The concept of Kazakhstani transition to a «green economy» implies deep systemic transformations by increasing the well-being of the people and the quality of life of the population while minimizing the burden on the environment and the degradation of natural resources. At the same time, it is necessary to calculate GDP through natural capital and, on this basis, to implement programs on renewable energy sources (RES). Figure 2 shows comparative forecasts of development of «green» and traditional economy in Kazakhstan according to KazNIEK.

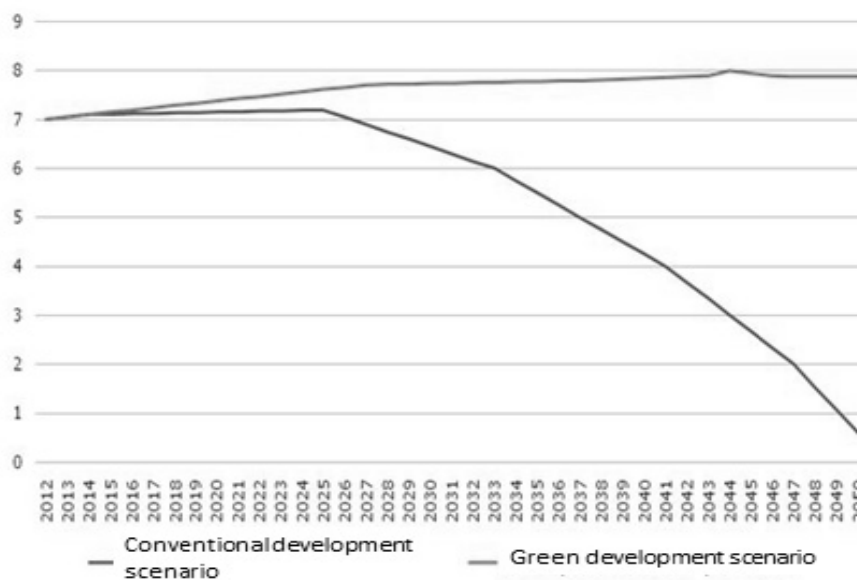


Figure 2. Projected GDP growth rates of Kazakhstan (%)

For this reason, it is necessary to develop a methodology that would lay the depreciation charges for the reclamation of spent coal basins and the creation in their place of recreation and fishing zones, as well as the restoration of felled forests.

For example, forestry should be given licenses for deforestation if they plant the same amount or even more than cut down. We have already lost the relic forest near Semey and not only there [5].

The concept is implemented within the strategic development plan for the Republic till 2050. It includes also seven key directions of development of «green economy». Taking into account updating of industry and regional programs.

The first direction — introduction of renewables and preservation of minerals. Even the largest energy resources which are possessed by Kazakhstan once will be exhausted, so it is necessary to look for new resources for activity. But in RK there is a good ecosystem, including water resources, the woods, soils that considerably upgrades the rating it before other countries

The second direction — energy efficiency in housing and communal services. As the considerable part of city housing stock has been constructed in Post-Soviet time, the majority of housing estates are equipped with inefficient heat-insulating designs and the systems of heat supply that leads to considerable thermal losses. Now in Kazakhstan the power service companies designed to carry out actions in the field of thermal insulation of objects and debugging of operation of devices of heat supply work.

The third direction — organic husbandry in agriculture. It provides refusal of synthetic fertilizers (pesticides) and feed additives. It is about the use of organic fertilizers for ensuring productivity, growth of cultural plants. «Gardening» of agriculture will allow to provide food to the population, without doing harm at the same time to natural resources. At the same time it is planned to work in the following directions: management of fertility of soils; effective use of water; mechanization of farms.

The fourth direction — improvement of a control system of waste, including household and food waste.

We have huge opportunities of conducting green business in this sphere. In the country about 30 billion tons of waste of various origin are saved up — it is about 1800 kg on the person. Annually again about 700 million tons of industrial wastes, including 300 million ashes and slags are formed, and utilized by

different estimates from 1 % to 5 %, for comparison in Europe — 60 %. The share of household waste — 3,5 million tons, annually in RK each person makes them on 300 kilograms, 92 million more tons are waste of livestock production from which it is possible to produce biogas. So far it at us at the level of an error in 0,2 %, and in Japan — 90 % [6].

The main pollutant is fuel and energy complex in which coal fields are especially allocated. Warehousing of sub-standard coal considerably pollutes the soil on the huge area of farmlands, reduces productivity of crops and worsens an ecological situation in general.

According to experts, in RK 95 % of garbage lies under the open sky, polluting the environment. It is utilized only as it was noted above, 5 % of waste, and the rest is stored on grounds or forms spontaneous dumps which quantity constantly grows. In the country there is no system of separate collecting garbage, there is no communication between his producers and consumers, more than 90 % of useful fractions of the general collecting make losses. It is also supposed to use waste as a by-product of a production cycle, for example technology of complex processing of municipal solid waste and receiving alternative fuel. But there are problems, connected or with not competence of the persons making decisions, or their corruption.

In Kazakhstan the attempt to build waste recycling plants repeatedly became, but it is unsuccessful since all chain of the movement of garbage hasn't been created: sorting, processing, and recycling.

The western companies quite often dump to Kazakhstan obsolete technologies and the equipment under the guise of the advanced achievements. For example, capital-intensive incineration plants which emit dioxine and furana much more cede to new pyrolysis Russian and even Kazakhstan modular installations («Stork-200» — NPO Bazalt Tomsk, Unilux LLP, Almaty). So in 2007 in Alma-Ata the waste recycling plant which doesn't function now any more has been constructed. The similar plant has been entered in Astana in December 2012, a similar situation.

International experience shows that the developed countries have approved national programs for processing of waste and receiving the electric power from them. In Sweden, for example, the program of obtaining electric energy from waste is implemented. Moreover, the waste isn't enough there, and Swedes annually buy about 800 thousand tons in neighboring countries [7].

In RK it is necessary to make so that all mechanism has been supported with acts on the principles of «carrot and stick» that the enterprises had a motivation of use of secondary raw materials and to punish those who don't collect garbage and will organize unauthorized dumps. Except penalties and privileges, there has to be an educational system since small years since we have very low ecological culture

The fifth direction — improvement of a control system of water resources. Water remains a key natural component of activity of the person and integrity of ecosystems. In this regard, rational use of water resources remains the problem assuming a huge scale. Here both watering of agricultural grounds, and construction belongs to pass hydroelectric power station, and a construction of channels, dams, etc.

The sixth direction — development of «clean» transport. In the large cities, and especially in megalopolises of 50–80 % of harmful emissions it is the share of personal vehicles therefore increase in a share of the inhabitants using public transport directly improves ecology of the cities. The majority is now transported on the basis of gasoline or diesel fuel that leads to high emission of greenhouse gases. Therefore the system of public transport, electric vehicles, safe options of movement for pedestrians, cyclists and also movement with use of other not motorized vehicles has to gain distribution. It is planned to direct 10 percent of the investments allocated for development of road infrastructure, for creation of walking and bicycle paths. It is necessary to notice that the electric vehicles working at the level of the existing technologies, don't solve a problem since accumulator charging in terms of conditional fuel, and further on hydrocarbons demands in two big tomorrow.

The seventh direction — preservation and effective management of ecosystems. Activity in this direction is directed to maintaining unique natural wealth of the country: recreational territories, parks, woods, lakes and rivers. According to statistics of department of ecology about 70 % of the woods at us are cut already down [8].

Within the program of development of «green economy», Kazakhstan plans to invest means in 10 key sectors of economy: agriculture; housing and communal services; to the power engineering specialist; fishery; forestry; industry; tourism; transport; utilization and processing of waste; water resources management.

The figure 3 below shows the relationship between the green economy and the sectors of activity.

Financing of projects of «green economy» will require the state help: tax incentives, toughening of technical regulations, credits for research works, demonstration projects, and also «gardening» of the state infrastructure and consciousness.

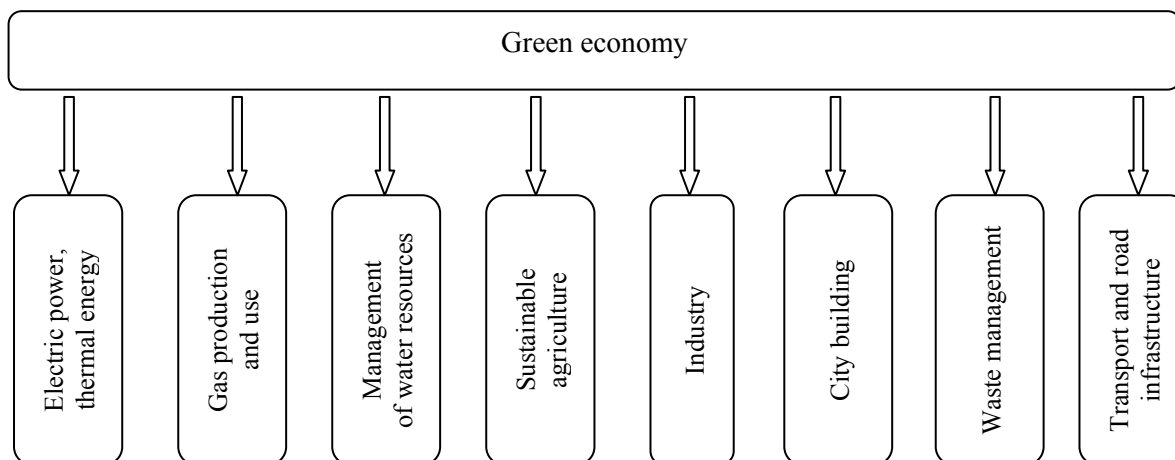


Figure 3. Green economy for Kazakhstan, education and promotion

For coordination and control of transition to «green economy» Council for transition of Kazakhstan to «green economy» at the President of the Republic of Kazakhstan is created. This Council considers each three years the National report on transition to «green economy».

Creation of similar body is the mechanism of realization of large-scale transformations in public sector. For example, this approach has been successfully used on Taiwan, in Great Britain, South Korea and Bahrain [7].

Everything listed above will serve as the catalyst for the unprecedented global «green» course sending the capitals, technologies and working force to this sector. The rural population also represents itself commercially favorable market for small-scale technologies of «pure» power.

The understanding of close interrelation between ecology, economy and social problems gradually becomes general: doesn't cause doubts that employment, salaries, savings and investments have to grow, a pollution of the habitat and unemployment — to be reduced. Therefore the new course towards development of «green economy» is necessary not only for prevention of the worst consequences of excessive use of natural resources, exhaustion of ecosystems and change of climate, but also for creation and fixing of a wide range of highly paid innovative working places. The true criterion of economic stability of the country is employment.

According to experts, by 2030 about 20 million of only «direct» working places will be created at the environmentally friendly enterprises. It is, of course, very underestimated figure — without accounting of the animator of employment and a clustering of «green» processes in economy, so that it is possible to talk about hundreds of millions of potential «green» working places.

But the oil and gas sector which provides 6,5 % of world economy, first of all, gets in the way of development of «green economy» on a global scale, and this is 4,9 trill. US dollars a year that there are more economies of Japan or Germany. Therefore big over the profit of the traditional energy sector slow down development of effective ecological innovations. And «green economy» is playing a supporting role so far.

By one estimates, oil gives a third of all energy of mankind, gas today — about 15 %, the hydropower is even three times less [6]. On others, data of the International Energy Agency, the oil share makes for today 32 %, natural gas — 22 %, atomic energy — 5,6 %, and hydroelectric power stations give 2,3 %. On alternative energy sources (or RES), all combined, in planetary scale is necessary — 0,7 %. The forecast of structure of world power balance for 2043 following: gas — 27 %; oil — 24 %; coal — 27 %; nuclear power plants and hydroelectric power stations — 4–12 %; renewables — 4 %. It is necessary to hope that by this time new sources of energy will appear and a new ecological culture will be finally formed.

It is necessary to consider that the cost of alternative energy is several times higher, than cost from traditional power sources. However the statistics demonstrates that harm from coal power on the environment is 4,5 times more, and gas is in 4 thousand times more harmful than atomic. Exactly here it is necessary

to place emphasis on advantages of development of RES since they reduce influence on ecology. Therefore it is necessary to conduct promotion in media that the climate is connected with future questions, and its change leads to disaster. For this purpose, a method of calculation of GDP, which considers the natural capital (load of ecology) has to be developed and approved.

Need of development of «green economy» should be considered both in geopolitical aspect, and in aspect of national security. Recently in media quite often began to say that some countries of the former Soviet Union are considered by the Western civilization and not only it as «reserve territories». At the same time it is possible to consider various alternative options, for example the scenario of general warming which will provoke thawing of glaciers and to flooding of Western Europe and America. It can lead to their food security, and then under a pretext «you have huge free territories, you possess big resources, but you can't rationally use them, you destroy the woods, etc.» «our partners» will try to put national elite under control and to carry out expansion.

As experts note, the axis of Earth tends to shift, and it conducts to a cold snap or warming of these or those territories, depending on axis shift. According to this theory Atlantic froze and underwent freezing of certain regions of Eastern Siberia several times already according to this scenario. The cold snap of Atlantic happened and when waters of the Labrador Current «pressed down» Gulf Stream in a point of «duck under», and presently it can be done due to powerful explosion. Therefore once again it is necessary to repeat that the «green economy» should be considered strategically, and quickly to conduct implementation of the developed concepts with a position of national security.

Important factor of involvement of RES in electricity generation is a decrease in harmful emissions in the environment, but these technologies are still noncompetitive in the market with hydrocarbons [9].

Therefore in innovative programs it is necessary to stake on technologies of tomorrow which launch large mass production in the next 2–3 years.

A promising direction is a project to modernize old coal boiler houses, which have already served their resources, but still work, polluting the atmosphere or simply mothballed. So in St. Petersburg, special boilers have been developed that will operate on special fuel (Topal-1) produced from household waste [10].

According to experts, when recycling waste, 25 % of the material composition of solid household waste (MSW) are energy-intensive components that are the basis for alternative fuels. The technology involves the selection of valuable and useful components from solid waste, and the remaining fractions are used for the production of fuel and its subsequent combustion. This will reduce by 65 % the volume of wastes that are safe for landfilling at landfills.

It should be noted that the technology for the transformation of the dried and crushed mass of «secondary raw materials» has been known since the 50s of the last century. However, unfortunately, only a few years ago we began to show interest in this valuable resource. In many respects this is due to the fact that it is an alternative fuel relative to the traditional energy sector. At the same time, one must adhere to the principle: burning waste without sorting is environmentally harmful and economically impractical. As an example, we can cite Western Europe, where strict environmental requirements are applied. However, incinerators work around the clock, not polluting the atmosphere, as Europeans have previously selected all useful components from solid waste.

Without transition to green economy Kazakhstan can't reach the planned indicators of decrease in power consumption of GDP, resource-saving, implementation of the international ecological conventions and agreements. Creation of national innovative system is impossible without institute of support of green technologies, without transition to the principle of the best available technologies (BAT) of the European Union put in the Ecological Code.

In 2017 in Astana the EXPO-2017 exhibition at which I was an opportunity to show to Kazakhstan citizens and guests from other countries the future of power and green technologies is held. But, unfortunately, we aren't in vanguard of this development yet to show and offer own developments and technologies in this sphere. The exhibition had fact-finding — informative character for children, youth and the population more in general. Government officials and the domestic companies have actively been involved in process of its organization. Unfortunately, holding a specialized exhibition hasn't led to structural changes in national economy so far. But the positive trend of development of RK towards power efficiency took place. First of all, it was the first large-scale project in Kazakhstan on promotion and publicizing of use of alternative energy sources. Besides, the EXPO exhibition has allowed Kazakhstan to take away 2017 105 energy saving projects from the different countries for introduction from them itself.

In a broad sense, it is possible to carry steady power to branches of green economy, including RES, biofuel, increase in energy efficiency, resource-saving, processing of waste, ecological housing construction and architecture, «the clever cities», trade in «green» goods, organic agriculture, an aquaculture, steady transport, ecological tourism, ecosystem services and others.

In the narrow sense of the word the «green economy» is the renewing energy source (REI). In Kazakhstan there are considerable resources of renewable energy in the form of hydraulic power, energy of the sun, wind and biomass. But so far only the hydraulic power is used rather actively.

According to experts the greatest effect in development of RES can be reached at the expense of a possibility of granting to realization of surplus of the electric power developed from objects of RES in public network. To the natural persons who don't have a possibility of connection to the general power supply system, the state will give financial support for acquisition of the RES installations, at the same time 50 % of the cost of installation with a power up to 5 kW are compensated from the republican budget.

In 2018 the Ministry of Energy of RK plans to hold the first pilot auction for acquisition of the energy received from renewable sources. But there is a serious opposition from traditional power engineering specialists. Not because renewables are able to compete at the prices now, nor the market mechanism is just entered, and power engineering specialists are monopolists on energy transportation, and it essentially doesn't suit them. Even when the renewable power will be cheaper traditional, RES producers can be hostages of present coal monopolists who will demand still big subsidies from the state.

Today in a section of regions work on design and construction of RES is intensively conducted. By 2020 in the Republic 13 new wind installations have to construct which will produce 79,3 MW, 14 hydroelectric power stations on 170 MW and 4 solar power stations. It should be noted that on other sources [11] the general power of RES — 490 MW (68 objects) and until the end of 2018 are planned to build 138 more MW. In the East Kazakhstan region the Kazakhstan-Spanish enterprise Spain Consulting has started construction of a wind station (VES) in the 24 MW Ulansky district. Two more 60 MW and 10 MW VES are under construction near Karaganda, there already another Spanish company has begun to build solar power station.

As it was already noted, the cost of RES is much higher than coal power which share makes 60 % of power production now. For decrease in costs it is necessary to hold, in our opinion, the following events:

- to increase several times financing of research on energy saving and production of alternative energy sources;
- to carry out mass introduction ecological, power — the preserving innovations;
- to hold regularly auctions on RES;
- to consider an environmental pressure when calculating cost of the electric power;
- to modernize the energy, transport and water-supplying infrastructure so that it meets international standards;
- to demonstrate the advanced experience of developed countries, based on the specific features of their country and even the region.

Of course today a share of RES making only 1 % in the overall power balance of RK, and in the Concept of transition to «green economy» the purposes are put — till 2020 the country has to reach 3 %–4 %, 2030 of-10 % and 50 % — by 2050. These are ambitious goals, but they are reference points for development of all economy of Kazakhstan on the future [5].

It is considered to be that about two percent from GDP are enough for the starting capital in greening of economy, for stimulation of new green branches and green infrastructure. The annual turnover of the eco industry of EU countries makes 2,5 % of GDP, about 1,5 % from all employed are directly engaged in this sphere, ¼ of all investments are investments into clean technologies.

In Kazakhstan the power, transport and water providing infrastructure doesn't meet the international standards, it needs to be modernized on the basis of advanced technologies. Investments into small-scale power generation quickly pay off and increase access for the population to cheap energy. Therefore they should be considered as priority.

Thus, it is necessary for successful introduction of ecological economy:

- to direct investments into perspective branches which are economically and ecologically perspective;
- to build regulatory requirements and regulations so that business hasn't been ready for operation of outdated infrastructure, taking high profits;

- quickly and flexibly to adapt to the changing conditions, to look for new niches of the market, to acquire new knowledge and skills, to offer new goods and services;
- to count GDP formula taking into account the natural capital and on this basis of a message implementation of the RES programs [7, 11];
- to promote and cultivate a culture of rational use of resources, starting from kindergarten and further along the entire educational system.

It is visible that promotion and publicizing of use of alternative energy sources in Kazakhstan in embryo, however last EXPO exhibition — has laid 2017 the foundation for this process. Besides since kindergarten, school, and further average and highest institutions, in media it is necessary to propagandize and impart the culture of rational use of resources. To show the best practices of Japan, Sweden and other developed countries, relying on specific features of the country and even region.

Transition to «green economy» has to be smooth and have step character: from coal to gas, then from gas to RES. Then introduction of green technologies will allow Kazakhstan to increase GDP by 3 % by 2050, to create more than 500 thousand new jobs, to create new industries and services sectors.

According to us, it has to increase the level and quality of life of the population, will make production of more competitive in the market due to decrease in energy consumption and use of secondary processing of waste. The realized measures will improve ecology in general and liquidate deficiency of resources in separate branches and regions.

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### «Жасыл экономиканың» қазақстандық даму жолы

Мақалада Қазақстан Республикасында «жасыл экономиканың» тұжырымдамасын іске асырудың теориялық қырлары қарастырылған. Ұлттық экономиканың тұрақты дамуына жәрдемдесу үшін негіз болып табылатын «жасыл экономиканың» мәні, мазмұны және негізгі қағидалары талқыланған. «Жасыл» экономиканың негізгі жетістіктері қарастырылған — «жасыл» жұмыс орындарын құру, жаңа «жасыл» өндіріс салаларын құру, жоғары технологиялық жұмыс орындарын ұлғайту, экологиялық тұрғыдан тұрақты экономиканы құру және әлеуметтік даму болашағы. Қазақстан Республикасының экономикалық дамудың жаңа «жасыл» бағыты бойынша трансформациялау мәселелері зерттелді. Жаңа экономикалық мүмкіндіктер пайда болуына әкелетін «жасыл экономикаға» көшу үшін қажетті жағдайлар мен құралдар жасалды. Алынған нәтижелер негізінде Республикадағы экологиялық-экономикалық саясатты жетілдіру бойынша мазмұндама мен ұсыныстар



берілген. Авторлар баламалы энергия көздерін өндіру шығындарын азайту бойынша шаралар ұсынған.

*Кілт сөздер:* «жасыл» экономика, экология, экологиялық дағдарыс, қалдықтар, баламалы энергия көздері, мемлекеттік қолдау құралдары.

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### Казахстанский путь развития «зеленой экономики»

В статье рассмотрены теоретические аспекты реализации концепции «зеленой экономики» в Республике Казахстан. Определены сущность, содержание и базовые принципы «зеленой экономики» как основы стимулирования устойчивого развития национальной экономики. Рассмотрены ключевые достижения «зеленой экономики» — создание «зеленых» рабочих мест, создание новых «зеленых» производственных отраслей, увеличение высокотехнологических рабочих мест, создание экологической устойчивой экономики и перспективы социального развития. Изучены проблемы трансформации Республики Казахстан на новый «зеленый» курс экономического развития. Сформулированы условия и инструменты, необходимые для перехода к «зеленой» экономике, которые приведут к возникновению новых экономических возможностей. На основании полученных результатов даны характеристика и предложения по совершенствованию эколого-экономической политики в республике. Авторами предложены мероприятия по снижению издержек на производстве альтернативных источников энергии.

*Ключевые слова:* «зеленая» экономика, экология, экологический кризис, отходы, альтернативные источники энергии, инструменты государственной поддержки.

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