

Original Research Paper

# “Green Economy” as the Country’s Development Strategy with a High Share of the Commodity Sector in the Context of Globalization

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**Abstract:** The “Green economy” is a economy, aimed at preserving a well-being of society through the effective use of natural resources and ensuring return of end-use products in the production cycle. First of all, the “green” economy focused on economic use of the resources that are currently subject to depletion (natural resources-oil, gas) and the rational use of inexhaustible resources. The “Green economy” is one of the important tools for ensuring sustainable development of the country. Development of the “green economy” will allow Kazakhstan to avoid the ecological crisis, which has affected many post-industrial countries. The major objective of this study is to determine the readiness of the country to a path of the “green growth” reform, based on the principles of the sustainable development. In order to determine the country's place in the world, the methods of multivariate statistical analysis applied to establish criteria in relation to global indicators. As a result, on the basis of this criteria the share of investment for certain developed and developing countries was calculated, which should be directed to the economy transformation. According to our calculations, the countries with a high share of mining sector require a radical restructuring of the economy. Thus, developed countries and countries with high human development index and low levels of corruption have a better chance for a successful implementation of the reforms on the path of the “Green growth”. Kazakhstan, Russia and other countries with low economic, social and political indicators of readiness to the “Green Economy” transition have a long way to socio-economic and political transformation towards efficient economy, civil society and development of the state.

**Keywords:** Kazakhstan, The Green Economy, Energy Efficiency Investments

## Introduction

The global economic crisis has revealed significant problems of the world economic system based on the principles of free market. With a development of the globalization and increasing complexity of the international economic relations, a structural integrity of the national economies starts to vary substantially. The absence of a serious leverage on the world market and lack of coordination between state regulators promotes migration crisis from national economies of one country into another, translating them into the plane of international relations. Subsequently, the crisis phenomena takes form of the global, significantly reducing the effectiveness of state regulation in the

context of national economies, exposes the problems of socio-economic and environmental benefits. Under the market model of development, these problems will only worsen and hamper further socio-economic development of humanity. In order to achieve a harmonious development of the society, states need a new round of systemic transformation of social-economic relations, based on the concept of the sustainable development.

The “Green economy”, i.e., a system of types of economic activity related to the production, distribution and consumption of goods and services, is defined as the main tool for sustainable development. Such activity leads to the improvement of human well-being in the long term, while not exposing future generations to significant environmental risks or ecological deficit.

As is known, the sustainable development provides a close interrelationship between the three components-economic, social and environmental. The concept of the “green economy” is designed to ensure a more harmonious coordination between these components, which would be acceptable to all countries-developed, developing and countries with transitional economics. However, it should be take into account that it does not replace the concept of the sustainable development. Currently, there is a more and more common recognition that achieving sustainability almost entirely depends on creating a proper economy. Stability remains the most important long-term purpose, but the economy should be made “green” to achieve it.

Supporters of the “green economy” concept believe that the prevailing now economic system is not perfect. Although it gave certain results in improving the living standards of people in general and especially of its individual groups, the negative effects of the functioning of this system are considerable: These are environmental problems (the climate change, desertification, loss of biodiversity), the depletion of natural resources, large-scale poverty, lack of fresh water, food, energy, the inequality of people and countries. All of this poses a threat to present and future generations. The green economy has become the beginning of a new technological order, which replaced the high-carbon and eco-wasteful one.

Certain conditions must be created for the transition to the “green” economy. These conditions include the relevant national legal regulatory documents, policies, subsidies and incentives, the world market, legal infrastructure, protocols on trade turnover and financial assistance. Currently existing conditions favor and contribute to the preservation of the “brown” economy, which, in addition, is highly dependent on energy extracted from fossil fuels.

## The “Green Economy”: The Concept, Conceptions and Principles

The way of transformation, which passed many developed and developing countries has a common name the “green economy”, but each country has its own view on the development. Economics and economic relations have long ceased to be distinct categories, today they are closely linked with development of society and government, as long as with a status of the environment. In this regard way of changes, which countries have to pass in building the “green economy” depends on the social-economic and environmental challenges as well as the goals they want to achieve in the future (UNEP, 2011).

Accumulated international experience in implementing the principles of the “Green Growth” in economies of some countries spawned some fuzziness, uncertainty of the concept. Today, there are three approaches for understanding of this phenomenon

(Netzer, 2012). The simplest approach to the “green economy” requires an active implementation of green technologies and reducing environmental pollution. At present, almost all developed and developing countries are concerned about the environment and public health. However, only few of them managed to find a model of effective solutions to the environmental problems, which do not go to a burden on the economy of the country (Baer *et al.*, 2011).

The scientific mainstream currently holds the points of view that increase in social welfare is also one of the main objectives of the “green development”. Solution to environmental, social and economic problems is the main priorities within the framework of global development. However, their integrated solution within the framework of national economies, not only requires the will and capability of the state, but also the conscious desire of society. This way passes only a few developed and economically strong countries, in particular Germany, Denmark, South Korea, Singapore and Brazil (Fensterseifer, 2012).

The most radical idea of the “green economy” suggests differentiated understanding principles of the sustainable development, depending on the varieties in the economic development of countries (Netzer and Althaus, 2012). This point of view has a place for existence, as it seems impossible to find out a perfect recipe of conversions on the way to the “green economy” that would come up to all countries with any type of economic development. However, there is no need for a diversified concept of the sustainable development, as the best starting conditions for the economic reforms have underdeveloped countries. The less country has previously invested in intensification of production, so much the more opportunities to choose a way of development it has today, especially in the context of the globalization.

Building the “green economy” can be possible granting effective cooperation between state and society, including development of civil society, social choice and social responsibility of citizens, social justice, as well as elimination of corruption and abuse of public trust. Achievement of the social justice is a task equally shared by both the state and society and every citizen and people. In this regard, the path of reforms can be differentiated not only in terms of economic development, but also depending on social situation and development of public relations.

### *Purpose of the Study*

Various characteristics of economic, social and environmental development in the countries make them different to start a reform. In this context, the purpose of this study is a determination degree of countries readiness to reforms on a path of the “green growth” based on the sustainable development principles.

Let us formulate basic provisions and abstracts, a relevant point of view of the authors, based on the above:

1. The ultimate goal of the “green economy” is to increase welfare and health of population
2. The achievement of established goals should be result of a long-term planning
3. The “Green Economy”-a process aimed on modernizing market economy towards enhancing social and economic responsibilities of business to society
4. Optimization of governance is a key to economic reform and relations
5. Enhancing the role of society is a prerequisite for building harmonious social and economic relations
6. All conversion processes in the economy should be maximally open and transparent
7. Objectives, methods, parameters can be changed in accordance with current needs of society and business and the principles of building the “green economy”
8. The conversion mechanism-is a central and binding process, where the objects are-social-economic and environmental relations, the subjects-society, state and business

### **Implementation the Principles of “Green Economy” in Kazakhstan**

Kazakhstan is the ninth largest country in the world in terms of area (2 724.9 thousand sq km.) and the sixth-on national wealth thanks to minerals, natural resources and untapped territories. Republic, despite the wealth of carbon minerals (coal, oil and gas), chose the path of sustainable development. Kazakhstan views the “green” economy as an economy, aimed at preserving the well-being of society through the effective use of natural resources as well as ensuring the return of end-use products in the production cycle. First of all, the “green” economy is directed to the economical consumption of those resources, which are currently subject to depletion (natural resources-oil, gas) and the rational use of inexhaustible resources. At the heart of the green economy are friendly or “green” technologies. According to the experts, development of the “green” economy will assist our country to avoid ecological crisis, which has affected many post-industrial countries.

On the initiative of the President Nazarbayev in 2013 the concept of transition to the “green” economy has been developed. According to the concept, there is a list of priorities, mainly aimed at reforming certain sectors of the economy (The concept of transition to the “green economy”, 2013). In the framework of the transition to “green” economy, it is suggested:

- Improve the efficiency of resources
- Improve infrastructure of Kazakhstan
- Improve the population welfare

The implementation of the Concept is planned in three phases:

- The first stage-2013-2020 years. -Optimization of the resource use and improving the efficiency of environmental activities, as well as a creation of the “green” infrastructure
- The second stage-of 2020-2030. -Rational use of natural resources, introduction of renewable energy on the basis of high technologies
- The third stage-2030-2050 years. -Transition of the national economy towards the principles of the “third industrial revolution”, which is based on the use of natural resources in the event of their renewability

### **State of the Kazakhstan's Energy Sector**

The growing energy consumption in the world, in turn, gives a rise to various problems and the most important of them is related to the global climate change. According to the estimations of many scientists, experts and international organizations, the further increase in the average temperature of Earth's climate system may lead to very serious changes in economic structure and living conditions of millions of people on the planet. This problem is being on the agenda of world states and major international organizations for more than three decades. According to the World Bank, the vast majority of the countries take additional voluntary commitments to reduce Greenhouse Gas (GHG) emissions, increase the use of renewable energy sources, or even the abandonment of hydrocarbon fuel (Sweden, Iceland).

Kazakhstan has also joined to the most famous environmental agreements in the world. In 1995, Kazakhstan ratified the United Nations Framework Convention on the Climate Change. RGRK (1999) Kazakhstan signed and ratified in 2009 the Kyoto Protocol on the Climate Change.

As is known, the main sources of greenhouse gases are the industrial enterprises, transport and agriculture. Energy sector brings significant “contribution” to the increase in their concentration along with other sectors. According to the energy consumption per unit of GDP, Kazakhstan enters the top ten of the most energy wasteful countries in the world, spending 500 grams of fuel in oil equivalent (oe) on production of 1 dollar of GDP, while the countries of the Organization for Economic Cooperation and Development (OECD) spend 130 grams of fuel in o.e., (Fig. 1).

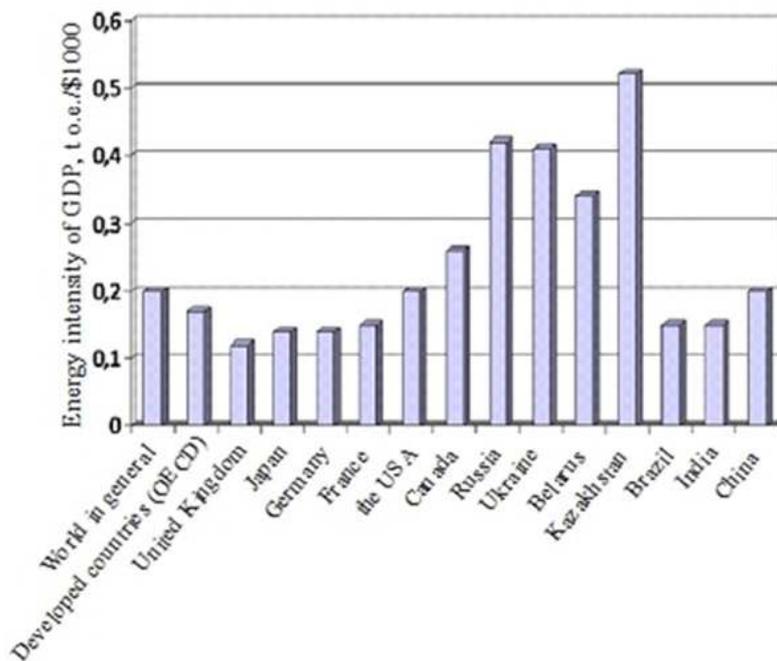


Fig. 1. Energy capacity of GDP in different countries, t o.e./\$1000, Source: Key world energy statistics, IEA, 2009

The most effective solution to the problem of reduction of natural resources is a practice of the energy conservation and introduction of energy efficient technologies. The improvement of the energy efficiency is a very urgent issue for Kazakhstan's economy. Specific indicators of energy capacity of GDP in Kazakhstan, according to the data of the International Energy Agency (IEA), remain very high (1,8 USD/kg f.e) compared with developed countries (5,5USD/kg f.e). During the period of reforming the economy from 1991 to 2001, energy intensity of GDP has increased by 15-20% more, which had a negative impact both on the economy, as a whole and on end users. During the period of 2001-2012, the energy intensity of GDP has slightly decreased, but was still higher than the average world trend by 5 times.

According to expert data, overrun of fuel for electricity production is 10-15%, for heating-15-20%. The costs of implementing of power saving are about 5 times lower than of a new energy production. The major objective of Kazakhstan is a reduction of energy intensity of GDP by 40% by 2020 (compared to 2008) (DGRK, 2010).

In the Republic, a prevailing fuel for electricity and heat energy is still coal, the dynamics of Energy Resources Structure (ESS) is shown below, as can be seen, the dominant participation of coal is forecasted in it until 2030 (Fig. 2).

Kazakhstan occupies 8th place in the world for the proven reserves of coal. According to the "Statistical Review of World Energy», prepared by the British BP

company, the coal reserves in Kazakhstan are at the level of 33,6 billion tons (3,9% of world reserves).

As shown, the greatest contribution to carbon dioxide emissions (greenhouse gas) is brought by energy sector and from energy carries-coal. Calculations show that the share of coal in the generation of emissions will grow intensively. By 2020, it will amount to 66% of the total gross emissions from fuel combustion (Ganda and Ngwakwe, 2014).

Coal production in Kazakhstan in 2015 amounted to 107,189 million tons and will continue to increase, due to the increasing energy consumption per capita. According to the data of the World Bank, Kazakhstan is ranked 10th among the most energy-intensive economies in the world. This is due to the fact that the domestic power-and heat power sector is built predominantly on charcoal-63%, whereas the global index of a coal power balance is only 23%. The country is not yet able to completely abandon the coal electricity. But now, there are already ways to effectively use and the "greening" of coal, one of them is the methods of technological cleaning it from harmful mineral admixtures developed by a group of scientists of the University of Nottingham (United Kingdom) (Steel and Patrick, 2003). Therefore, it is necessary to introduce such technologies in the energy sector of the country. One of the important areas is energy-saving, i.e., replacement of outdated energy-intensive equipment with modern energy-saving models and the gradual transition to alternative renewable energy sources-wind, solar, geothermal.

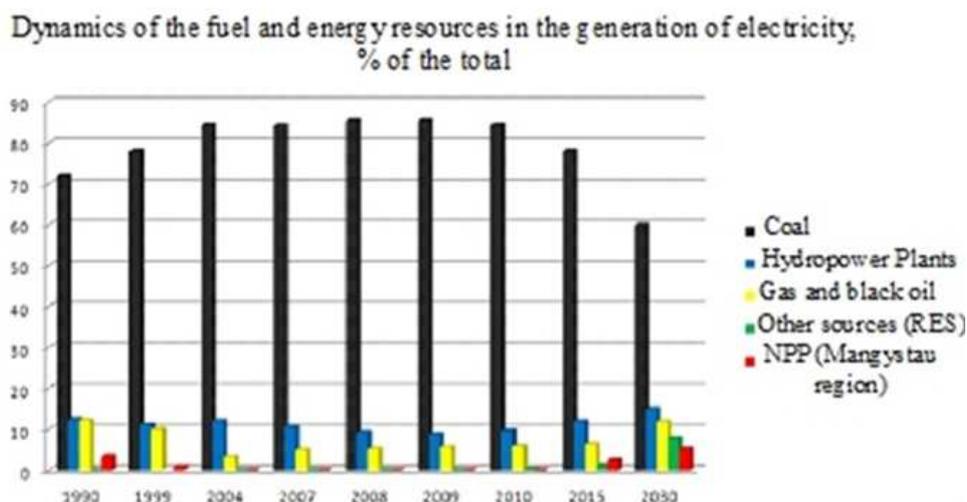


Fig. 2. Dynamics of the structure of fuel and energy resources of Kazakhstan in the production of electricity for the period of 1990-2030 Source: <http://www.stat.gov.kz/>

Kazakhstan, despite the richness of carbon minerals (coal, oil and gas), chose the path of the sustainable development. The “Green economy” is defined as the economy with a high level of quality of life of the population, the careful and rational use of natural resources for the sake of present and future generations and in accordance with the international environmental obligations adopted by the country.

### The Potential and the Development of the “Green” Energy Sector

The search for alternative energy resources in the world practice shows a necessity for the use of renewable energy sources. Kazakhstan has a fairly vast potential of renewable energy. Their use is part of the strategy of the Republic of Kazakhstan on transition to the sustainable development. Thus, we will conserve the energy resources in the form of reserves of fossil fuels and the environment for our future generations. The most affordable and common in nature are: Water, solar activity and wind.

Wind, solar energy is an inexhaustible, environmentally friendly energy resource in general and for Kazakhstan it is national wealth, with which it was endowed richly by the nature. Power generation from wind does not require the costs for production and transportation to the place of consumption. Kazakhstan leads the world for the presence of wind resources and their high speed, unchanged for long time wind intensity, especially in natural wind corridors.

The Wind Atlas of Kazakhstan for 10 promising sites by the regions was created and wind potential was calculated by the Project of the Government of the RK, United Nations Development Program and the Global Environment Facility (Astana, 2011).

### Wind Energy Resources

Wind energy potential in Kazakhstan is estimated at 0,929-1,82 billion kWh per year by the UNDP experts. The studies carried out in the framework of the UNDP project on wind power show the presence of the average annual wind speed of more than 6 m/s in a number of regions of Kazakhstan with a total area of about 50 thousand sq. km. This makes them attractive for the development of wind energy. The most important are wind power resources of the Zhungar corridor (17 billion kWh per sq. m). The first sites for the construction of Wind Power Plants (WPP) were selected on the basis of the available meteorological data:

- Dzhungar WPP-40 MW
- Shelek WPP-140 MW
- Saryozek WPP-140 MW
- Alakol WPP-140 MW
- Karoi WPP-20 MW
- Shengeldy WPP-20 MW
- Kurdai WPP-20 MW

The total capacity of these WPPs will amount to about 520 MW with annual power generation of about 1,8-2 billion kWh. Investment in construction of these WPPs is about 500 million US dollars (RGRK, 2011).

The Wind power is the fastest growing kind of renewable energy sources. The Government of the Republic of Kazakhstan and the United Nations Development Program “Kazakhstan is the initiative of wind energy market development”, examined the distribution of wind power potential in the territory of Kazakhstan. Shelek corridor in Almaty region is defined as one of the most promising regions for the construction of a wind power plant. In this connection, a project for the construction of wind power plants is implemented.

Table 1. The construction of solar power plants according to the Plan for 2013-2020 (RGRK, 2013)

Description of activity	Period of implementation	Estimated costs, mln. US dollars
Construction of SPP in Kapshagai of Almaty region with a capacity of 2 MW	2014	11,33
Construction of SPP in Zhambyl district of Zhambyl region with a capacity of 24 MW	2015	57,67
Construction of SPP in Kyzylorda region with a capacity of 50 MW	2017	96,80
The project for the implementation of environmentally friendly energy with the use of a solar photovoltaic system in the Republic of Kazakhstan	2014	10,00
Total:	176	

Table 2. Planned facilities of a renewable energy (RGRK, 2013)

The objects of a renewable energy	Quantity of a renewable energy	Capacities of a renewable energy (MW)	Input timing (year)
Hydropower plants	14	170	2020
Wind power plants	13	793	2020
Solar power plants	4	77	2020
Total	31	1040	

In 2014, the volume of electricity generation by Renewable Energy Sources (RES) amounted to 1% of its total consumption, in 2020-3% and by 2050-already 50%.

### *Solar Resources and Hydro-Electric Engineering*

The potential of solar energy in the country is 1 trillion kWh. The most preferred areas of placement of solar generation are the Aral Sea region and the southern regions of Kazakhstan experiencing electricity shortages. Modern hydropower sector compared to other traditional forms of electric power industry is the most economical and environmentally friendly way to generate electricity. Small hydro-electric engineering goes even further in this direction. Small Hydropower Plants (HPP) allow saving natural landscape, the environment; to preserve fish in rivers and water quality.

Until 2017, approximately \$2,8 billion will be invested in Almaty region for the construction of power plants that produce electricity from renewable energy sources. The total capacity of power plants is expected to reach 919 MW. Already now, Almaty region generates about one-third of the consumed electricity from renewable sources. Their share in total energy consumption rose from 16% in 2011 to 27% in 2014. This performance has been achieved through the introduction of several renewable energy facilities: Moinak HPP, seven small hydropower plants and one solar power plant.

In Kazakhstan, according to the Action Plan for the development of alternative and renewable energy for 2013-2020, it is expected to implement the following projects in the area of the use of renewable energy sources (Table 1) (RGRK, 2013).

Thus, it is planned to put into operation about 31 renewable energy facilities with a total installed capacity of 1040 MW by 2020 (Table 2).

It is estimated that by 2050, the conversions in the framework of “green economy” will allow to further increase the gross domestic product by 3%, to create more than 500 thousand new jobs, to establish new

industries and services, to provide high quality of life for the population everywhere.

### **The Green Economy: A Price of the Transformations**

Implementation of transformation and transition to a new stage of development of the economy and society has a number of significant barriers, which vary depending on the readiness of countries to move towards the “green economy”. The most important of them, economic, social and governance issues, are significant to solve. The financial aspect is related with a fact that there is a need to divert significant funds for the development and implementation of non-waste technology with zero cycle. Surely under the correct policy implementation, these investments will pay off the state, but the price will be a huge.

Amount of costs necessary for changing economic and socio-political situation in accordance with the sustainable development principles is a relative quantity. It depends primarily on the structure of economy, efficiency and energy intensity of industrial production, emissions into the environment as well as on factors such as a social welfare and efficiency of public administration. For each country, depending on the internal situation, it will have its own value. Despite various starting conditions in countries around the globe, the globalization dictates uniform standards of economic relations to meet the common requirements. This makes it possible to conduct a quantitative study and calculate a relative measure of countries readiness for a reform on the path of the “green growth” based on an analysis of comparative figures.

### **Research Methodology**

A key component of the “Green Development” from perspective of the authors is energy efficiency. At the

micro-level energy efficiency should be addressed primarily via minimum heat and electricity use. In this regard, private construction should be build according to standard of “Eco-Home” as well as in industry-with low energy consumption- “Passive home”. This parameter can be transferred to the macro level comparing the energy efficiency of per capita (index respect to the amount of resident population) and energy consumption per unit of gross domestic income (index relative to gross production output). As follows their product shows the overall socio-economic efficiency with respect to energy consumption, which is the criterion of degree of readiness for transition to the “green economy.”

The greatest impact on the environment has a producing sector of the economy and energy generation. However, the mining sector has the lowest economic productivity and with increasing degree of raw materials processing as well as manufacturability, its production increases markedly. Moreover, power generation is also possible from “green sources” with zero impact on the environment. Therefore, taking into account all these factors, we calculate the criterion of economies readiness towards changes in line with the sustainable development principles by using methods of multivariate statistical analysis. For comparative analysis we define these criteria in relation to global indicators that allow us to determine the country's place in the world:

$$K_g = \frac{\frac{H_k \times GDP_k}{H_0 \times GDP_0}}{\left(\frac{E_k - E_g}{E_0}\right)^2}$$

According to the formula listed below follows:

- $K_g$ -degree of the country readiness to economic reforms
- $H_k$ -population of the K-th country
- $GDP_k$ -gross domestic product of the k-th country
- $E_k$ -energy consumption of the k-th country
- $H_0$ -the planet's population
- $GDP_0$ -the world's gross domestic product
- $E_0$ -world energy consumption
- $E_g$ -consumption of pure (green) energy in the k-th country without pollution of the environment (include solar, wind, geothermal and ocean energy)

### Analysis of the Result

Lets us analyze the results of calculation the indicator of country readiness for transition to the “green economy.” In order to simplify data, as an indicator of energy consumption we take index of electricity consumed and for the consumption of clean energy-wind energy as a large segment of the most “green energy” production (Table 3).

In a virtue of our estimations the mixed results have been obtained for some countries that require deeper analysis. Thus the data are in good agreement with the actual situation, typical developed countries. For example, economy of Denmark is the most prepared for reconstruction of the country according to principles of the Sustainable Development. Denmark is a recognized European leader in implementing of “green technologies” in the economy and has already undertaken a phased modernization of industry and energy from the beginning of the last decade. German industry is the largest manufacturing sector in Europe, however it requires more than one decade for incremental changes and significant investment injections to transform economy that makes Germany only at the beginning of this path.

From representation of the developing countries, the economy of Kenya is the most ready for change, for example 75% of production in the country relates to agriculture and the share of mining sector. Nevertheless, the mineral wealth of the country is very small. Industry is mainly focused on production of final products for domestic market, much of which is focused on the agricultural sector. Electricity consumption per capita on average 45 times is lower than in developed countries and 30 times less than in Kazakhstan. In this regard, this gives Kenya a good opportunity to have a significant potential for the economic transition with a small investment. It should be noted that Kenya requires substantial investment injections for the economic development of industry, agriculture and welfare of the nation as well as competent government economic policy, proper planning and implementation of infrastructure projects.

Kazakhstan as well as Russia applies to the countries with a large mining sectors in the economy and requires significant investments to modernize and restructure economy and industry, as a level of energy consumption per capita in Kazakhstan is only 1.5 times less than in the developed countries and GDP average of 3 times. Subsequently, economy productivity is three times lower than in the developed countries. In these circumstances, significant investment in restructuring and modernization in industry becomes inevitably essential.

Based on this criterion, we can calculate the proportion of investment that needs to be addressed to the economy in relation to the gross investment by the following formula:

$$KI_g = \frac{1}{\alpha + K_g}$$

where,  $\alpha$  is a corrective indicator that can be calculated by means of statistical analysis of the dynamics  $K_g$  and implemented investments in green technologies for preceding 10 years for each country individually.

Table 3. Calculation criteria of the economies readiness to changes (UN, 2013)

Country	Energy consumption	Wind energy consumption	GDP		
Unit of measure	mlnKWτ/hour	mlnKWτ/hour	Population	USA \$	
				Researched index	
Argentina	148919	218	42538304	6,14384E+11	1,26
Belarus	37877	3	9466000	73097619637	0,52
Brazil	550447	3466	204259377	2,39208E+12	1,74
Denmark	35831	4807	5614932	3,35878E+11	2,09
Germany	600965	34250	80645605	3,74532E+12	1,00
Japan	1045293	2669	127338621	4,91956E+12	0,62
Kazakhstan	94519	5	17035275	2,31876E+11	0,47
Kenya	8461	0	43692881	54930813988	35,80
South Korea	541996	561	50219669	1,3056E+12	0,24
Malaysia	138529	0	29465372	3,23343E+11	0,53
Russia	1045416	15	143506911	2,07902E+12	0,29
Turkey	246356	2959	75010202	8,23243E+11	1,11
World, total	23430761	318596	7174521359	7,16664E+13	1

Table 4. The share of investment to GDP, required to transform the economy (estimates) in dynamics for 2010 and 2013

Country	KI <sub>g</sub>		
	2010	2013	Changes
Argentina	53,56%	44,21%	-9,35%
Belarus	71,89%	66,00%	-5,89%
Brazil	40,72%	36,45%	-4,27%
Denmark	32,69%	32,34%	-0,35%
Germany	53,97%	49,90%	-4,07%
Japan	63,43%	61,91%	-1,52%
Kazakhstan	73,37%	67,93%	-5,44%
Kenya	3,28%	2,72%	-0,56%
South Korea	82,47%	80,72%	-1,75%
Malaysia	64,90%	65,36%	0,46%
Russia	78,44%	77,43%	-1,01%
Turkey	43,64%	47,33%	3,69%
World, total	50,00%	50,00%	0,00%

However, for comparative analysis we take  $\alpha = 1$  as it becomes possible to calculate the rate same way for all of the selected countries (Table 4).

As we can observe the countries with a high share of the mining sector requires a radical restructuring of the economy. However, with respect to 2010 for the next three years, we can see some progress. The best success in modernization of the economy and industry towards the “green” growth made Argentina, Belarus and Kazakhstan. A negative result showed the Turkish economy, which over the years has become more volatile and less committed to the principles of the sustainable development.

## Discussion of the Results

### *Social and Political Factors*

In spite of financial costs societal barriers also play a significant role. State plays a leading role in building the “green economy”. In reality, the government alone cannot carry out such a global transformation of the socio- economic relations. In order to finance

reconstruction of the economy, modernization, social security system, complicating the system of public administration large investments are required. In this regard, these consequences will have an effect on increase in the tax burden on the economy and business as well. Inefficient economy in the long run will do the conversion pointless and wasteful.

Transition to a new formation of the socio-economic relations is nothing more than, for example, transition from capitalism to socialism or vice versa from socialism to a market economy, when changes in economic relations were accompanied by significant social reform without consent of directing will of society. On the one hand, society relies on reform when is keenly aware of transformations will make life easier and more convenient. On the other hand, state should consider reforms from the perspective of investment, which now requires significant resources and effort, however in the future will increase efficiency of the state apparatus and significantly reduce cost of its maintenance. Nevertheless, reforms will be meaningless if conditions do not facilitate implementation of fair business, adherence to the “rules of the game” that improve economic relations.

Based on the foregoing, another equally important criteria for a country's readiness to the transformations will be both of degree of the civil society development and government efficiency. They are a key component for successful implementation of the reforms, which can be described by the following indicators: The human development index and index of corruption. The worse these indexes for the country are, the higher will be a cost of reform and lower the probability of success.

### *The Most Perspective Trends of the Renewable Energy in Kazakhstan*

Kazakhstan is a rich country with natural resources. In addition, it has a vast territory and different climatic conditions for the development of the renewable energy

sources like wind, solar and geothermal. But among them there is a hydroelectric power, as Kazakhstan has significant water resources. The water resources capacity of the country is theoretically 170 billion kWh per year. However the only small part of it is currently used. Thus, the total installed capacity of the hydropower plants of Kazakhstan amounts to 2 350,16 MW. Basic generated capacities are located on the rivers of Irtysh, Ili and Syrdariya. Cost-effective water resources are concentrated mainly in the east (Mountain Altai) and in the south of the country. Construction of the Moinak HPP (300 MW) is completed, Bulak HPP (78 MW), Kerbulak HPP (50 MW) and a number of small HPPs are being designed.

Small hydropower plants are the most rapidly developing areas of the country's renewable energy use. Thus, in the period from 2007 to 2010-th in the Almaty region the five small hydropower plants were set to work with a total installed capacity of 20 MW. Construction of hydroelectric power plants operating without retaining dams on the small rivers is one of the important areas of Kazakhstan's energy efficiency. According to the experts, the best result will secure construction of small hydropower stations cascades on the rivers of southern Kazakhstan.

Despite the fact that water-power engineering refers to the renewable energy source, its use is often associated with serious disturbances to the environment. In particular, a lot of agricultural and conservation lands are withdrawn from circulation, spawning of fish and the whole river ecology are disturbed, forests are cut down for construction of electric transmission lines. In this regard, water-power engineering cannot be fully attributed to the green electric power industry. However, hydraulic engineering structures are of great use in irrigated agriculture as part of an integrated water management system.

Another area that is rapidly developing in Kazakhstan is a nuclear electric power industry. Kazakhstan has huge reserves of uranium (2nd place in the world) and occupies the first place for its production. Kazakhstan has almost a full cycle of producing nuclear fuel for nuclear power plants. However, Kazakhstan does not have even a single active commercial reactor on its territory as there is no need for the construction of large power units. In this regard, Kazakhstan, jointly with Russian scientists, carries out design and survey works on the construction of a new series of safe compact small nuclear power plants of the 3+, 4 generations with an installed capacity of 200 mWh. From an environmental point of view, the nuclear power plants of the 4th generation can be referred to completely safe, since they operate on natural uranium.

However, the greatest interest for Kazakhstan being a country with huge reserves of coal is the use of clean

technologies of energy production based on this kind of raw material. One of the most profitable and promising methods of mining is the technology of underground coal gasification (UCG). The UCG is a method of coal mining, based on transformation of coal into a combustible gas in the depths of the in situ, where the methane content of mineral coal is used to improve energy efficiency of the UCG process (Sajjad and Rasul, 2014). In a simplified form, the UCG process is represented by a burning underground coal-bed, where the product of combustion is a gas. The content of methane is only a few percent and the main combustible components are carbon monoxide (CO) and hydrogen (H<sub>2</sub>). The gas of underground coal gasification has all the advantages of gaseous fuel.

## Conclusion and Recommendations

The "Green economy" is a balanced model of the economic development, providing a growth of social welfare, social justice and the environmental safety. Kazakhstan has chosen a sustainable path of development and is an active supporter of the "green economy". To do this, the country has a potential and opportunities. The country is one of the first in Central Asia that adopted the concept of transition to the "green economy", which defined its phased implementation.

Energy efficiency at the macro level is a benchmark characterizing the degree of economic preparedness to the "green development". The countries with a high readiness for change ( $Kg > 1$ ) require a little or no significant economic restructuring. Developed countries and countries with a high human development index and low levels of corruption are more likely to implement reforms successfully on the path of the "Green Growth".

Kazakhstan, Russia and other countries with low economic, social and political indicators of readiness to move to the "green economy" are off to pass a long way to socio-economic and political transformation towards efficient economy, civil society and development of the state.

Renewable energy sources are very promising, innovative and more and more economical, but, as a rule, they require support from the state and regional authorities. In using renewable energy resources, the reduction of environmental problems (the elimination of air, water and soil pollution), which increase every year, is no less important. By 2020, the contribution of renewable energy sources in electricity production in Kazakhstan is expected to be increased from 1 to 3%.

The development of autonomous systems of electric power and heat supply to consumers in remote areas is the priority for Kazakhstan's conditions due to the large area and low population density.

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## Author's Contributions

**Askarova Maulken:** Information gathering, structure formation and writing of the article.

**Medeu Alikhan:** development of the research method and performance of calculations in the analysis of results.

**Medeu Akhmetkhal:** Research proposal as well as the plan development.

## Ethics

This article is original and contains unpublished materials. The authors declare that there are no conflicts of interests.

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