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**Challenges and Opportunities"**

**ONE ENERGY ZONE, ONE WAY OF SUSTAINABLE  
DEVELOPMENT (THE SILK ROAD COUNTRIES)**

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***Abstract***

In the article presented the perspectives of the Silk Road countries development in the aspect of their integration within the framework of the One-Belt and One-Way Initiative, covering a set of countries with a significant variability in the parameters of economic development. The emphasis of the research on the energy aspect of cooperation determined the assessment of the level of national production energy intensity, the energy consumption of countries, etc. The list of these criteria is supplemented by indicators related to the states' commitment to the concept of sustainable development – it concerns emissions of CO<sub>2</sub>, the state and prospects of alternative energy development and etc. Authors used several different indexes, such as: energy use, CO<sub>2</sub> emissions, energy use per \$1,000 GDP, and adjusted savings: mineral depletion. The state of the relationship between the economic, environmental and energy components of development was determined based on material from countries geographically adjacent to the initiator of the revival of cooperation within in the project “One Belt-One Road” – China, Russia and Mongolia. Authors considered the key cooperation areas of countries in the sphere of energy in the frame of present research. The focus and specificity of the countries' participation in the framework of energy cooperation was examined including with the participation of international organizations. Special attention is paid to assessing the place and role of the Russian Federation. The authors used factual material on such countries as China, Russia, Mongolia, as well as others to illustrate the provisions submitted for discussion.

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**Keywords:** Energy- intensity, power engineering, Silk Road Economic Belt.



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## 1. Introduction

In the article presented the perspectives of the Silk Road countries development in the aspect of their integration within the framework of the One-Belt and One-Way Initiative, covering a set of countries with a significant variability in the parameters of economic development. The emphasis of the research on the energy aspect of cooperation determined the assessment of the level of national production energy intensity, the energy consumption of countries, the country's energy supply, etc. The list of these criteria is supplemented by indicators related to the states' commitment to the concept of sustainable development – it concerns emissions of CO<sub>2</sub>, the state and prospects of alternative energy development and etc.

The possible range of cooperation directions of the countries in the power engineering within the framework of this initiative, including the development of the corresponding infrastructure, is considered. The focus and specificity of the countries participation in the framework of energy cooperation was considered, including with the participation of international organizations, highlighted the main provisions. Particular attention is paid to assessing the place and role of the Russian Federation.

Integration processes, being a distinctive feature of the development of contemporary global economic ties, create additional incentives for intensifying the development of national economies, including based on the synergistic effect obtained through the exchange / sharing of production resources. Especially significant are projects based on increasing the effectiveness of non-renewable resources. That is why the initiative “One Belt and One Road”, which unites the countries of the Eurasian Economic Union and the Silk Road Economic Belt (SREB), is of undoubted interest. From a wide range of areas of cooperation, it is the energy sector that acquires a carcass-forming status, as it sets the dynamics of the national economies development of the participating countries (Matyugina et al., 2016).

The works of many scientists are devoted to the study of energy efficiency of economies problem in sectoral and territorial specificity (Kraft and Kraft, 1978; Liu, Chen, & Yin, 2016; Stern, 2000; Zhang, Cheng, Yuan, & Gao, 2011; Marias, Martinez, & De Miguel, 2006; Khademvatani & Gordon, 2013; Chien & Hu, 2007). The ultimate restrictive condition is the orientation of countries towards sustainable development, involving an economic (energy) and environmental components (Mardani, Zavadskas, Streimikiene, Juson, & Khoshnoudi, 2017; Zhang et al., 2011; Fang & Chen, 2017).

## 2. Problem Statement

It is precisely the interest in the triad of components that ensure the sustainability of the development of states that served as the basis for studying their comparison on the material of countries geographically adjacent to the initiator of the revival of cooperation within the Silk Road – China, Russia and Mongolia. This will not only reveal the bottlenecks, but also identify directions of tripartite cooperation. Special attention is paid to the energy component as forming the dynamics of economic growth and directly correlating with the environmental component.

### 3. Research Questions

This determined the formulation of the following research questions, which reflect the state of the energy sector in selected countries, as well as its relationship with the economic and environmental spheres:

- assess the changes of energy consumption per person;
- compare the dynamics of the above indicator with the changes of CO<sub>2</sub> emissions per capital;
- to evaluate the dynamics of the energy intensity of GDP as one of the most significant criteria for the efficiency of energy consumption;
- consider the state of alternative energy as a tool to reduce the energy intensity of national economies.

### 4. Purpose of the Study

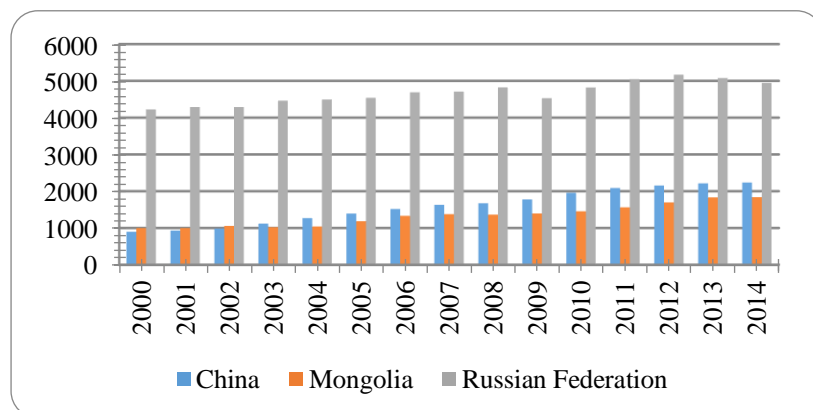
The purpose of this study is to compare the development parameters of the economic, environmental and energy spheres, taking into account the assessment of the prospects for cooperation between the countries participating in the Silk Road Economic Belt.

### 5. Research Methods

In the framework of this study, a systematic method was used to study the totality of interactions of countries arising in the process of implementing the initiative under consideration; methods of observation and comparison in terms of comparing the parameters of the considered areas; methods of analysis and synthesis. The factual base of the research is based on statistical material.

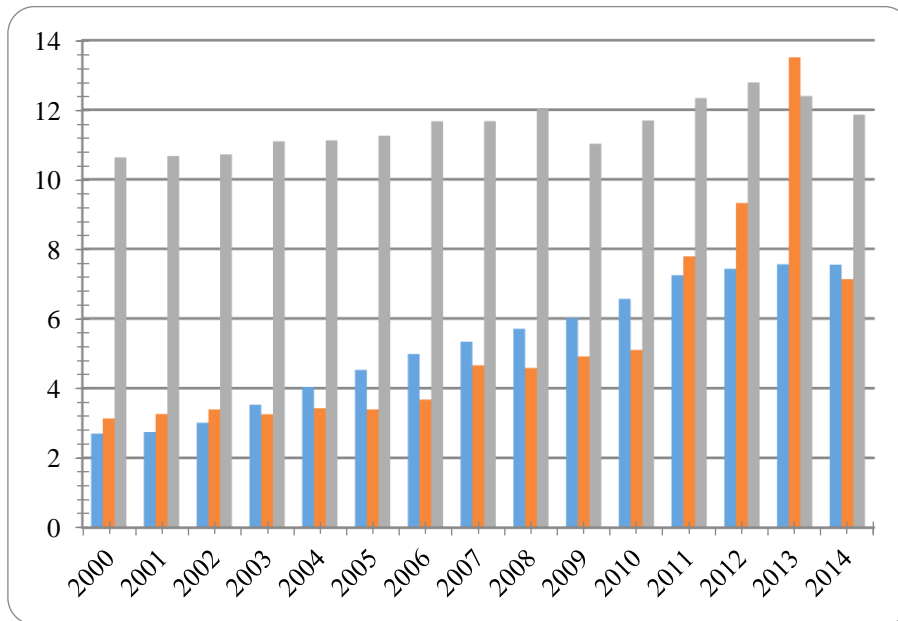
### 6. Findings

In the framework of this study, a systematic method was used to study the totality of interactions of countries arising in the process of implementing the initiative under consideration; methods of observation and comparison in terms of comparing the parameters of the considered areas; methods of analysis and synthesis. The factual base of the research is based on statistical material (Figure 01, 02).



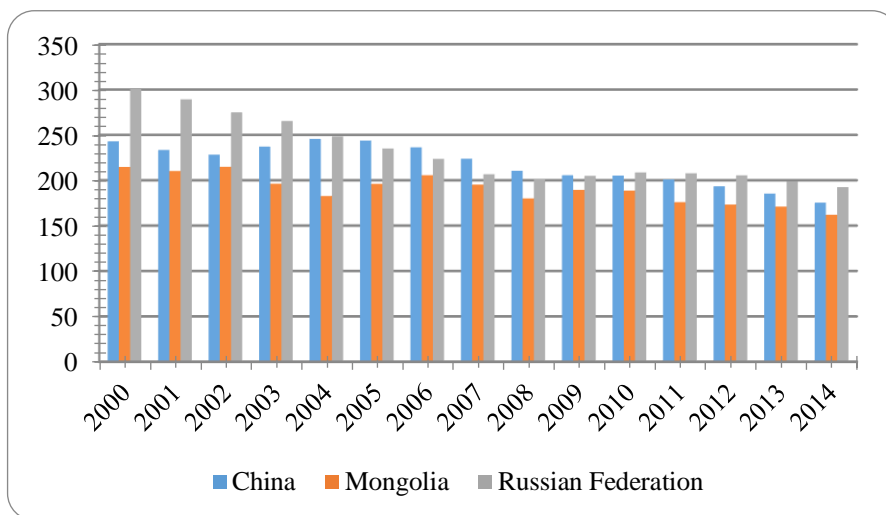
**Figure 01.** Energyuse (kg of oil equivalent per capita) (IEA Statistics © OECD/IEA, 2014)

The same dynamics is demonstrated by per capita CO<sub>2</sub> emissions, while in Mongolia there is a significant jump in the indicator in 2013-2014.

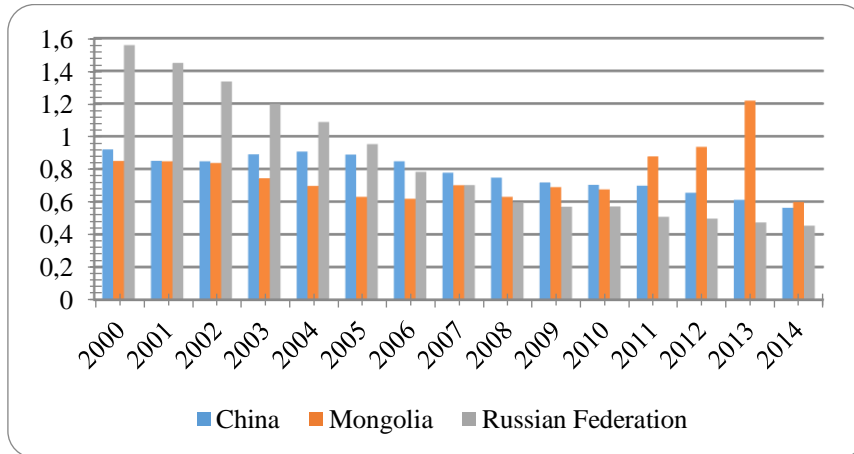


**Figure 02.** CO<sub>2</sub> emissions (metric tons per capita) (IEA Statistics © OECD/IEA, 2014)

Despite the increase in average per capita consumption, the energy intensity of GDP in all countries is falling, the most significant reduction in the indicator for the periods under review is demonstrated by Russia, as well as with respect to CO<sub>2</sub> emissions (Figure 03, 04).



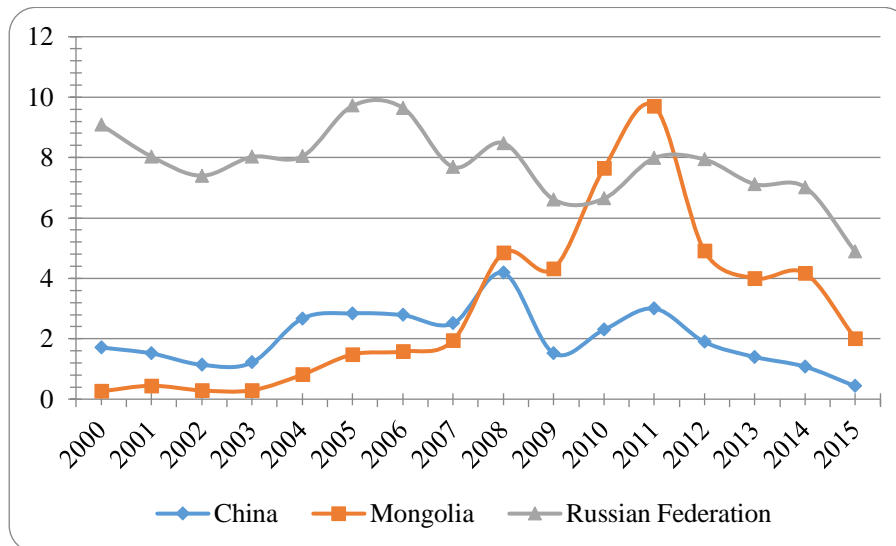
**Figure 03.** Energy use (kg of oil equivalent) per \$1,000 GDP (constant 2011 PPP) IEA Statistics © OECD/IEA, 2014)



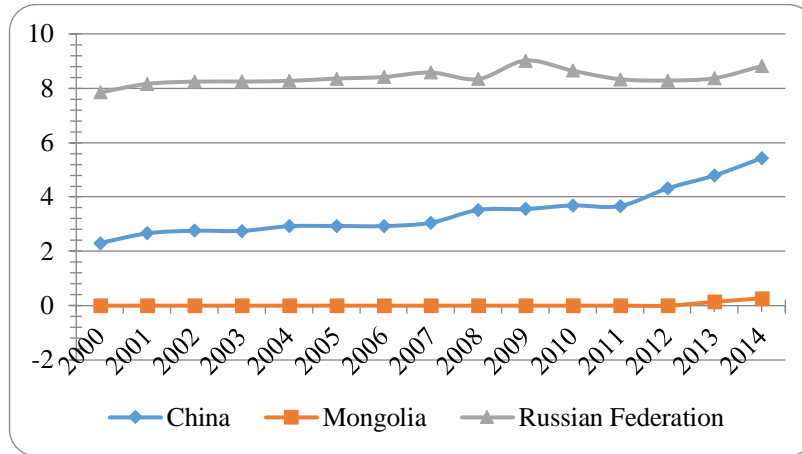
**Figure 04.** CO<sub>2</sub> emissions (kg per PPP \$ of GDP) (Carbon Dioxide Information Analysis Center, n.d.)

Estimating the structure of carbon dioxide emissions, it should be noted that in China, manufacturing and construction account for about 30-35% of the total; in Russia, this indicator is relatively stable (about 10%), in Mongolia, growth has occurred since 2005 (from 5% to 10 ... 15%). The contribution of transport to emissions is most significant in Russia (12 ... 16%), the minimum for China is about 8% (Carbon Dioxide Information Analysis Center, n.d.).

Each country faces the problem of depletion of energy resources against the backdrop of population growth and per capita energy consumption (Figure 05), an alternative energy source, whose share in the energy consumption structure of countries is extremely small (Figure 06).

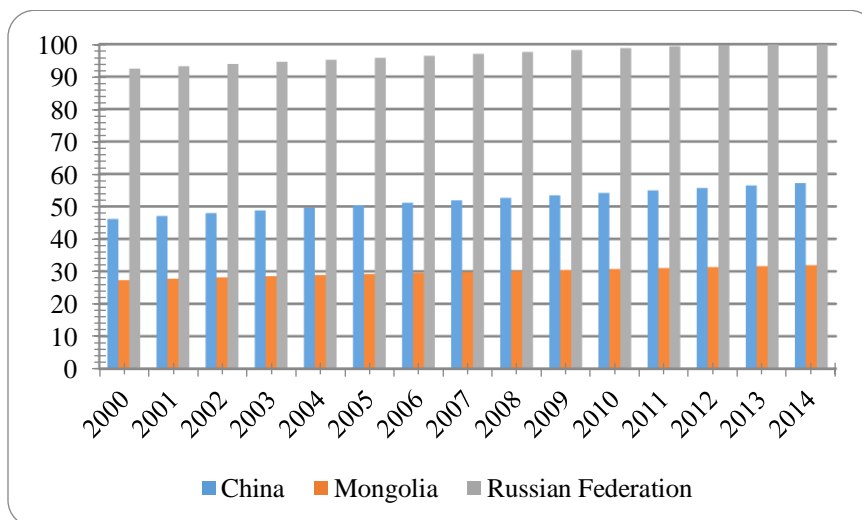


**Figure 05.** Adjusted savings: energy depletion (% of GNI) (World Bank staff estimates based on sources and methods in World Bank's, n. d.)



**Figure 06.** Alternative and nuclear energy (% of total energy use) (IEA Statistics © OECD/IEA, 2014)

However, this direction certainly has prospects for development, as evidenced by the level of access to clean fuels (Figure 07)<sup>1</sup> according to the Program of the State Council of the People's Republic of China, in 2020 in the structure of consumption of primary fuel resources, the share of non-carbon energy will expand to 15%, coal – will drop to 55%, oil – will increase to 23%, gas – will grow to 10% (Matveev, 2017).



**Figure 07.** Access to clean fuels and technologies for cooking (% of population) (World Bank, Sustainable Energy for All, n.d.)

Within the framework of the considered cooperation, SREB and EEU are supposed (Matveev, 2017):

- Creation of new capacities (in the Republic of Armenia – construction of the Meghri hydropower plant (the first stage of work was started in 2012), also power plants near Lari-

<sup>1</sup> Access to clean fuels and technologies for cooking is the share of the population, mostly using clean fuel for cooking and cooking technology. According to WHO

Berd and Shnokh cities; Belarus – construction of the BelAPS; in Kazakhstan – construction RES power plants with a total capacity of more than 3 GW, according to the state plan for the development of renewable energy; construction of the Kambar-Aty-1, Verkhne-Narynsky cascade of hydroelectric power stations, the tunnel HPS on the Kokomeren river in Kyrgyzstan, the North-South ETL; etc.)

- Infrastructure development (development of the grid economy of the Republic of, Belarus preparation of the national EES for the connection of BelAPS according to the “Comprehensive plan for the development of the electric power industry up to 2025 by the introduction of the Belarusian nuclear power plant”

At the same time, there is an expansion of the energy cooperation between the countries through the expansion of the capacity of the Iran-Armenia gas pipeline system, the construction of the ETL Armenia-Georgia, Armenia-Iran, the power transmission capacity of Belorussia-Poland, Belarus-Ukraine, the synchronization of the EES of Kazakhstan with the EES of China, countries of central Asia

Russia's participation is associated with such projects as the GPS “Power of Siberia-1” (the eastern route); “Force of Siberia-2” (western route); “The Power of Siberia-3”: Sakhalin – Khabarovsk – Vladivostok – China (the third route of gas supplies to China); construction of a plant for the production of LNG on the Yamal Peninsula, etc.

## 7. Conclusion

This study shows the prospects of cooperation between countries in the framework of the initiative “One Belt and One Road” This is due to the increase in per capita energy consumption. The growth in average per capita CO<sub>2</sub> emissions amid a reduction in the energy intensity of GDP indicates prospects for cooperation not only in the field of energy, but also in the development and implementation of energy-saving technologies, as well as alternative energy.

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