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FUTURE VISION AND POSSIBILITIES OF RUSSIA'S TRANSITION TO "GREEN" ECONOMY

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Abstract

The research paper raises a topical problem of maintaining a sustainable growth by responding to environmental and social issues faced by humanity. The paper conducts a comparative analysis of the levels of investment in energy-saving and environment friendly technology, made by countries across the world and by Russia in the process of going over to a "green" economy. To better review the problems related to the environment and climate change, the study addresses the issue of "green" financing and investment in sustainable infrastructure projects and assesses the future of this line of action in Russia. Although the Paris Climate Agreement only outlines certain guidelines, implementing its provisions will have an impact on the Russian economy. There is still much discussion on the role of Russia, and how its economic interests and international position in the world will be affected. The paper substantiates key areas where Russia can implement the concept of the "green economy."

Keywords: Economic development; "green" economy; investments; innovation; monocities.

1. Introduction

Increasingly deteriorating environment and climate change are making the global community turns to the problem of maintaining sustainable growth based on the sustainable addressing the environmental and social issues. At the G20 Leaders' Summit, held in China (Hangzhou, September 4-5, 2016) (Leaders, 2016), it was stressed that one of the top priority topics at the discussion was related to environmental and climate issues. To better address the issues, it is necessary to look at the problem of "green" financing and investment in sustainable infrastructure projects. And now it is essential to understand how Russia can

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maximize its benefits from the upcoming changes and what steps it should take for this purpose.

2. Methods

The basis of research in terms of theory and methods has been monographs and scientific articles of Russian and foreign scientists as well as applied research related to the issues of energy saving and increase of energy efficiency. When doing the research, the methods of systematic analysis of social and economic events and processes, the methods of economic analysis, those of managing of the branches and industrial complexes have been utilized. Legislative, statutory acts and resolutions of the State Duma, of the Government of the Russian Federation, which handle and define the policy in the sphere of energy consumption and energy saving, comprised the regulatory basis of the research. Data taken from Russian and foreign periodical publications; materials of Russian and international research and practice conferences, seminars, "round tables" has been applied in the research.

The paper analyzes the possibility of putting the Paris Climate Agreement in Russia, highlights the problems which this implementation involves, as well as substantiates the lines in the state policy, which help promote the introduction of "green" standards.

3. Results

The green finance channelizes the global economy to environmental friendly and low-carbon development. They aim to reduce the adverse impact on air, water and soil, minimize greenhouse gas emissions and improve the efficiency of resource consumption.

On the initiative of China, the issue of the "green financing" was included in the agenda of the G20Leaders' Summit (September 4-5, 2016). This refers to financing energy saving and cleaner production technologies by the government or investors, using revenues from "green bonds." These programs have been also implemented in China and India the past three years. According to the European Bank for Reconstruction and Development, in 2013, countries across the world issued "green bonds" worth $10 billion, in 2015 worth $40 billion. According to the Xinhua News Agency, China has issued one third of "green bonds" in the world in the first half of 2016.

Private investments in alternative energy have already achieved the rapid growth. A recent study by Pew Charitable Trusts (Smirnova, 2011) has revealed that global investment in renewable energy has risen by 30% in 2010 and reached $243 billion. This means a 63% growth as compared with lower levels in 2004. The leading position was taken in the last year by China with its $54.5 billion invested in "green energy," of which $45 billion were allotted to wind energy. Being a major global power consumer, China is also a leader in the capacity scheduled for commissioning not only in the nuclear sector but also in the "green" energy. In addition, China produced more than half of all wind turbines and PV panels in the world in the last year. Chinese companies are serious competitors of German photovoltaic manufacturers as having a comparable quality, their products are 20% cheaper. China is intended to actively develop solar parks – in 2020 their capacity is expected to reach 20 GW. However, more recently, Ren Dongming, a member of National Development and Reform Commission of the People's Republic of China (NDRC), has said on March 31st that Beijing wants to review these plans and develop solar energy even faster (Smirnova, 2011).

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China is followed by Germany where private investments have doubled to $41.2 billion. Most of the investments (81%) have gone to solar energy. A different solution has become more widespread in Germany – small solar panels mounted, for example, on the roofs of private homes. Owners of such panels can sell unused power to the public grid at prices several times higher than those on the market. Moreover, the government pays solar panel owners for the power that they consume themselves. According to Professor Bernd Rech, a photovoltaics expert of the Helmholtz Association, all German solar modules can achieve a total capacity of 12 GW on a sunny day (Smirnova, 2011).

With $34 billion, the United States is the third after Germany in terms of alternative energy investments. A major part of these investments (43%) goes to wind energy; solar energy accounts for 25%, and biofuels — 17%. The US remains the world leader in venture capital investments in new technologies but is losing momentum in production development.

Green energy investors can be conditionally divided into two groups with very distinctive investment strategies. The first group mainly includes infrastructure funds that buy already completed projects, such as PV power stations and wind farms. These investors are interested in a consistent annual income. Examples of such green investors are Danish private and public pension funds.

The second group of investors comprises venture capital funds that put money into companies creating innovative energy solutions. These investments are much more risky. The funds buy shares in technology companies, hoping to sell them a few years later and earn on the growth. For example, VinodKhosla, a co-founder of Sun Microsystems and the owner of the Khosla Ventures fund, believes that attractive projects are only those where the risk of failure is 90%, but which, if successful, could revolutionize the entire infrastructure. Being one of the most competent investors in Silicon Valley, he raises money for projects developing microbe-based diesel production technology, quantum batteries or underground systems extracting methane from coal. According to Khosla, climate change is not about ethics, but it poses a similar threat as nuclear proliferation or terrorism. By putting funds into new energy technologies, these investors are buying a kind of insurance against risks (Smirnova, 2011).

Another important area of investment deals with R&D in a new type of electrical power grid. A smart grid is better adapted to fluctuations in energy generation and consumption and helps to save power. When using alternative sources, it is impossible to avoid fluctuations because the power of a wind turbine or solar relies on weather conditions. Smart grid technologies are enjoying significant public investment in many countries. The first place in the trend is also taken by China with its $7.3 billion of government support in 2010, which makes the Chinese market a very appealing place to developers.

Table 1 shows global investment in renewable energy in 2014, as compared to 2013 (Global trends, 2015).

Table 1. Global investment in renewable energy in 2014, as compared to 2013.

Sector	$BN	2013, %
Solar	150	25
Wind	99	11
Biomass	8	-10
Biofuels	5	-8
Small hydro	5	-17
Geothermal	3	23
Marine	0.4	110

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It is obvious that there is no single, ideal energy source that could replace all other sources and remain completely sustainable. The challenge is to find the right combination of various sources and tailored energy efficiency.

Although the idea of "green growth" is fully supported by Russia at the official level, it is hardly interesting for the country as the process in any case means reducing oil and gas production and consumption. Cuts in carbon emissions at the expense of Russia took place de facto in the 1990s, and the absence of prospects for rapid industrial growth shelves the question on the country's role in the global transition to a green economy.

The accelerated development of renewable energy technologies, introduction of renewables and creating a new generation of nuclear power will replace traditional energy sources (oil, coal, gas) in the next decade. All this can not but reduce consumption of traditional energy resources and, as a consequence, lead to lower oil and gas prices by 2020. If hydrocarbons prices can grow in the short term, they will inevitably go down after countries ratify legally binding instruments to control greenhouse gas emissions. And it will be a blow to Russia's economic capabilities and will re-define its international position and role in the world. It is urgent for Russia to revise its energy strategy which is disfigured by conventional approaches and views on the future of energy markets. The views do not correlate with new threats, challenges and global strategic trends which are incorporated in current policies pursued by both Western countries and Eastern partners (primarily China). Russia should leverage its considerable intellectual potential to make use of emission control measures in the international and national interests (Zhigalov, & Pakhomova, 2015).

4. Discussion

More than 80% of the Russian power generation is based on zero carbon (hydro and nuclear power) or low carbon (gas) sources. For comparison: China has more than 60% of coal in its energy mix, while the US and Germany about 40% (Solomin, 2016).

Russia has no such significant potential to make wind and solar energy commercially available as Mexican steppes or deserts of the Arabian Peninsula (a key resource of renewable energy in our climate is the second largest hydropower potential in the world, tapped by only 20%). But the symptomatic trend is that consistent investments in new energy technologies have brought about drastic cuts in the price of clean electric power from renewables. And it may become cheaper than traditional energy already in the foreseeable future.

And it is, of course, not only and not so much about the financing for the construction of new solar plants and wind turbines. Good prospects for reducing greenhouse gas emissions – a precondition of the "green" financing – are offered throughout the energy chain: from fuel production, energy generation and transport to the efficiency of its utilization.

There is still much discussion on the role of Russia, and how its economic interests are affected by the transition to the green economy.

With its impressive energy resources, Russia is one of the key energy suppliers. It is among the top three oil producers (Russia, Saudi Arabia and the United States), and its gas production is second only to North America.

This profile attached to Russia in the international division of labor gradually brought about its weaker

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positions and degrading industries which produce goods with high added value and ensure national security, such as manufacturing, engineering, agriculture, pharmaceuticals and many more. Availability of affordable (relative to alternative energy technologies) energy resources with the cost which neglects expenses related to environmental damage and human health, resulting from their use, undermine incentives to invest in human capital, hamper scientific and technological progress and diminish its commercial use for energy saving purposes.

Sanctions and falling hydrocarbon prices have aggravated the existing financial slump and revealed all the disadvantages of the raw material economy. However, the economic slowdown started before 2014. Lifting the sanctions will not be a panacea for the Russian economy problems and will not lead to the progressive advancement of sectors that manufacture high added value products and ensure national security. In the context of globalization and international division of labor, these sectors will continue to degrade. A solution should imply structural reforms and rejuvenation of the economy.

According to the Global and Russian Energy Outlook to 2040(Table 2), energy consumption in the world will continue to go up (Arkhipov et al., 2014).

Table 2. Per capita energy consumption toe/person

	2010	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**Growth rate 2010-40**
World	1.87	1.91	1.96	2.00	2.03	2.06	2.08	0.4%
North America	5.81	5.63	5.58	5.50	5.39	5.26	5.13	-0.4%
Europe	3.31	3.15	3.15	3.15	3.15	3.14	3.14	-0.2%
EU-28	3.59	3.39	3.38	3.37	3.35	3.33	3.31	-0.3%
Developed Asia	4.53	4.39	4.41	4.41	4.40	4.37	4.33	-0.2%
CIS	3.74	3.85	4.01	4.17	4.31	4.43	4.58	0.7%
Developing Asia	1.15	1.31	1.44	1.55	1.65	1.75	1.84	1.6%
South and Central America	1.33	1.38	1.45	1.52	1.59	1.66	1.73	0.9%
Middle East	3.23	3.20	3.28	3.35	3.41	3.47	3.53	0.3%
Africa	0.68	0.68	0.68	0.68	0.67	0.67	0.67	-0.1%
OECD	4.49	4.33	4.33	4.31	4.27	4.22	4.16	-0.3%
BRICS	1.53	1.73	1.88	2.02	2.14	2.27	2.39	1.5%
OPEC	2.13	2.10	2.12	2.13	2.13	2.11	2.09	-0.1%

Although per capita energy consumption in Russia corresponds to general figures across the developed world (Table 2), the energy intensity of the Russian economy, however, is 2 times higher than figures from the developed countries (Table 3) (Arkhipov et al., 2014). This could have negative effects on the competitiveness of the Russian economy because of high energy supply costs. Good energy security of the Russian population is in fact negated by the low efficiency of the resources use inside the country.

Table 3. GDP energy intensity toe/$1,000

	2010	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**Growth rate 2010-40**
World	0.17	0.16	0.14	0.12	0.11	0.10	0.09	-2.1%
North America	0.15	0.14	0.12	0.11	0.10	0.09	0.08	-2.0%
Europe	0.12	0.11	0.10	0.09	0.08	0.08	0.07	-1.7%
EU-28	0.12	0.11	0.10	0.09	0.08	0.08	0.07	-1.6%
Developed Asia	0.14	0.12	0.11	0.10	0.09	0.09	0.08	-1.6%
CIS	0.33	0.30	0.26	0.23	0.21	0.19	0.17	-2.2%
Developing Asia	0.22	0.19	0.16	0.13	0.11	0.10	0.08	-3.1%

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South and Central America	0.13	0.12	0.11	0.10	0.10	0.09	0.09	-1.4%
Middle East	0.23	0.22	0.20	0.19	0.17	0.16	0.15	-1.5%
Africa	0.24	0.21	0.19	0.16	0.14	0.13	0.11	-2.5%
OECD	0.13	0.12	0.11	0.10	0.09	0.08	0.08	-1.8%
BRICS	0.22	0.20	0.17	0.14	0.12	0.10	0.09	-3.0%
OPEC	0.24	0.22	0.20	0.18	0.16	0.15	0.13	-1.9%

However, the possibility of reducing energy intensity through lower power consumption is extremely limited in Russia. Years of focusing on the export of raw materials have determined the role of the fuel and energy sector in the Russian economy. The fuel and energy sector provides more than a quarter of the country's GDP, almost 30% of its consolidated budget, two-thirds of foreign exchange earnings from exports and a quarter of total investment in the national economy. More than 45% of primary energy produced in Russia is exported accounting for 70% of its overall export earnings. The share of the energy sector in the added value of Russia's GDP, its exports and tax deductions to the budget is shown in Table 4 (Arkhipov et al., 2014).

Table 4. Share of energy sector in added value of Russian GDP,its exports and tax deductions to budget, %.

	Oil sector	**Gas sector**	**Coal industry**	**Electricity sector**	**Other sectors**
Share in added value of Russia GDP	17.6	9.7	2.0	0.6	70
Share in total tax deductions to Russian budget	41.8	6.3	1.4	0.5	50
Share in Russian exports	68.7	12.4	2.2	0.3	31.3

Meanwhile European countries show similar levels of energy consumption (Table 2), they import energy to other countries. According to the 2014 Outlook, EU countries will reduce their gas consumption by up to 50 billion cubic meters to 2040. This is linked not only to the slow rate of the economic growth, but mostly to the energy efficiency policies and efforts to promote alternative fuels. The 2014 Outlook assumes that the EU will use the entire range of tools provided by the state energy policy to curb the share of gas in its energy mix by contributing to alternative energy, switching to the "green" economy and minimizing its reliance on gas suppliers.

It is clear that Russia is unable to ensure the prevalence of alternative energy technologies in the short term, since its energy sectors today have strategic importance because they not only bring in budget revenues, but also define the distribution of the country's productive forces. According to the 2014 Outlook, Russia will double the use of alternatives and renewables by 2040, mainly thanks to biomass and waste management. The use of all types of alternatives and renewables will achieve the 1.9-2.6 times increase, and their share in energy consumption will grow from 1.1% in 2010 to 4.2% in 2040, but still they will play a local role in the Russian energy sector.

Therefore, the authors suppose that Russia has the following key routes for putting the concept of the "green" economy in practice: 1. Integrated and efficient utilization of resources that are already introduced in the economic turnover. For example, enhanced oil recovery (EOR), if applied, will help increase the resource base of the oil industry by improving the oil recovery factor (ORF). EOR in existing Russian deposits may add 10% to the recovery factor with the production increased by almost 20 million tons by 2035. But EOR pushes up production costs. If EOR is introduced, operating costs (excluding taxes) for Russian deposits may rise from $15 per barrel to $50 barrel (Nikishchenko, 2013). For this reason, its large-scale implementation is only viable with the government support and tax cuts. 2. Optimized energy

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consumption and fewer emissions through changes in the sectoral and product structure of the economy and a larger share of non-energy intensive sectors and products. This line involves the creation of high added value products, enhanced services, which in the long term will help turn from the raw material economy. If Russia chooses to go in this direction, it can use such specific resource as the potential of monocities. Russia's economy is strongly represented by core enterprises which form monocities. Monocities serve as centers for up to 70% of capacity in engineering, metallurgy, mining, processing of natural resources, and defense industry. Their contribution to GDP is estimated at 20-40% (National idea of Russia, 2012). Profitability of core enterprises affects the quality of life in the country and the performance of the Russian economy. Russia's successful transition to an innovative path of development is directly related to the efficient modernization of monocities and core enterprises. Infrastructure operating in monocities is the platform which can help enhance existing production facilities and create new ones. The structure of monocities broken down by the sector is shown in Table 5 (Russia in Figures, 2009).

Table 5. The sectoral structure of Russian monocities.

Sector	Weight by sector, %
Wood processing	20
Mechanical engineering	17
Food industry	14
Fuel industry	11
Ferrous and non-ferrous metallurgy	6
Other sectors	32

Government policies supporting monocities and unlocking their potential can ensure better development and less depopulation in the regions, improve the quality of life by creating more jobs and improving city infrastructures. Moreover, they can help launch new production facilities and will enable Russian products to occupy certain market niches. The latter output is particularly important in terms of sanctions and the need to ensure import substitution (Kirsanova, & Lenkovets, 2014). Monocity infrastructures can serve as a basis for further growth of high-technology sectors which will create products with high added value. This will help reduce the technological gap and the economy's dependence on oil and gas in the long term.

5. Conclusions

In the transition to a "green" economy, Russia should take into account the structure and distribution of production facilities. Unlike most developed economies which have set up through multinational corporations its production capacity in host countries with cheaper workforce, Russia carries out its industrial production mainly in its territory. For this reason, there are no benefits for our country if it reduces its production in order to mitigate the environmental impact. The authors conclude that the key areas where Russia can be included in the "green" economy are: Optimizing resource use, transforming the sectoral and product structure of the economy and ensuring a larger share of non-energy intensive sectors and products. Interests of the economy and nature protection should be well balanced and focused on the long term advantages. Reducing the weight of sectors, which exploit natural resources and pollute

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environment, in total output should go hand in hand with the development and introduction of innovations and structural changes in the economy.

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