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Green Financing in Russia: Current Status and Development Prospects

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ABSTRACT

The **aim** of the work is to assess the current state of green financing in the Russian Federation and develop proposals to stimulate its further development. The methodological basis of the research was modern economic and mathematical **methods**: cluster analysis, building a regression model. This helped obtain **results** that possess both a certain scientific novelty and practical significance. The authors considered the evolution of scientific consensus about the concept of sustainable development and the formation of a green economy. They analyzed the current state of green financing in the Russian Federation for 2000–2018. Clustering the constituent entities of the Russian Federation by environmental investments and current environmental expenditures allowed for identifying the regions, leaders and outsiders in these processes, as well as revealing a high regional differentiation in financing green projects. The regression model helped prove that with increased investments in fixed assets aimed at environmental protection and rational use of natural resources by 1 million rubles, Russia's GDP will increase by 0.1 billion rubles. Increasing current environmental expenditures in organizations by 1 million rubles will raise Russia's GDP by 0.3 billion rubles. The authors **concluded** that to stimulate the development of green financing in Russia, it is necessary to implement policies providing for an appropriate regulatory framework; development and use of new tools for financing green projects; creation of a specialized banking institution.

Keywords: green financing; green finance; green economy; environmental investments; Russian Federation

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INTRODUCTION

In recent decades, the world community has been actively discussing an economic growth model based on the development, on the one hand, of its fundamental foundations (technological progress and modernization of production, human capital, infrastructure, macroeconomic stabilization), and on the other hand, on the growth initiation through the “green” component. Under rapid scientific and technological development of the global economy, the anthropogenic pressure on the environment has significantly increased, which resulted in the environmental depletion, ecosystem degradation, and the decrease in the biosphere’s regenerative capacity.

Since the mid-1980s, humanity’s footprint has been larger than the planet’s carrying capacity and its ability to assimilate [1]. At present, humanity’s total footprint (demand) exceeds the Earth’s biocapacity (supply) by 50%. According to the calculations by the Global Footprint Network analytical center, in 2018, 1.7 global hectares per person were available worldwide. Russia is in the top ten countries with the largest biocapacity reserves (7.9% of all reserves) and the largest ecological footprint (4.0%).

In recent years, a growing number of countries have identified the concept of a green economy and the transition to green economic growth (OECD countries, Japan, South Korea, etc.) as a strategic development model of national economies. Russia is not an exception. In 2017, it adopted the Strategy for Ecological Safety of the Russian Federation for the period until 2025, which proves the direction for green economic growth. At the same time, it is impossible to achieve green sustainable economic growth, i.e. with no detriment to the environment and environmental depletion, without developing an effective green financing system.

GREEN ECONOMY AS A NEW PARADIGM OF ECONOMIC DEVELOPMENT

The interest to sustainable development in the context of global climate change and en-

vironmental deterioration has led to the development of a new paradigm in the scientific community — the green economy. With a variety of approaches to this problem, it seems appropriate to single out those that reveal interactions between economic growth and environment.

Studying the factors of economic growth, the winner of the 2018 Nobel Prize in Economics W. Nordhaus back in the 1970s recognized that the global climate and environment directly affect continuous economic development. Nordhaus actually combined models of economic growth and climate change into the Integrated Assessment Model [2]. The idea of the model was that the total use of natural resources corresponds to a certain amount of greenhouse gas emissions, which affect the average air temperature. In turn, air temperature determines the factor corresponding to environmental damage. As a result, the total productivity of production factors decreases due to environmental damage, which ultimately worsens the well-being of the population, inhibits economic growth and the development of human capital.

It is worth noting that W. Nordhaus’s views on the relationship between economic development and environment were not new for the scientific community. In the 1960–1970s, supporters of environmental economics (H. Daly, J. Martinez-Alier, P. Hay, R. Costanza, etc) developed the issues of climate change and negative anthropogenic impact on the environment. Representatives of this school considered the economy as an integral part of the ecosystem and believed that to solve environmental problems it was necessary to limit the economic growth rate by setting taxes on the use of natural resources, i.e. environmental taxation.

In subsequent years, the ideas of an environmentally oriented economy developed rapidly. In particular, in 1987, the Report of the World Commission on Environment and Development “Our Common Future” noted that ensuring equal coexistence between society

and the world, where achieving environmental safety will be a crucial part of sustainable development, is a major priority of the global economy. The definition of “sustainable development” was interpreted as the development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” [3].

In 1992, the United Nations Conference on Environment and Development (UNCED) adopted Agenda 21, which presents the fundamental principles of sustainable development. The World Summit on Sustainable Development (“RIO +10”), held in 2002, developed an approach to sustainable development as the integration of economic, environmental and social decision-making. The World Summit participants approved a roadmap for protecting the ecology of the Earth. The next UN Conference on Sustainable Development (RIO + 20), held in 2012, outlined the emphasis on the transition to sustainable development, based on the formation of a green economy.

The well-known German politician and publicist R. Fücks argued that a green revolution is necessary, since humanity reached the stage when the costs of economic growth, leading to environmental depletion, significantly exceed the effect of material advancement [4].

Prepared by scientists at the London Environmental Economics Centre in 1989, “Blueprint for a Green Economy”, for the first time, presented the term “green economy”. This paper presented the economic rationale for the concept of sustainable economic growth [5].

At present, both in foreign and in domestic literature, the formation of a green economy model is a dominant trend in the development of national socio-economic systems [6–7]. The analysis of publications devoted to sustainable development and greening economic activity, as well as the concept of green economic growth, allows to define the following distinctive features of the green economy:

a) low emissions of carbon and hydrocarbons;

b) preventing deterioration of ecosystem services and biodiversity;

c) conservation and increase of natural resources;

d) resource and energy saving;

e) increase in the living standard and income of the population [8–11].

It is impossible to build a green economy without developing an effective green financing system [12–18]. Note that modern economic literature does not provide a universally accepted definition of “green financing”. In a general sense, this term refers to the solution of environmental problems and resource management [19]. Currently, the term “green finance” is more frequent, referring to investment in environmental projects [20–22]. Green finance underlies the concept of green (low-carbon) economic growth, as it provides a link between financial institutions, environmental protection and economic growth.

O. V. Bogacheva and O. V. Smorodina include here financial services provided to business entities for economic activities on improving the environment, mitigating the effects of global climate change, and more efficient resource use [23]. Green finance includes various branches of the financial sector and financial products [24].

According to foreign scientists, green finance is a market investment or credit programs that considers the environmental footprint when assessing risks or uses environmental incentives to make business decisions [25].

The analysis of the existing economic literature helps conclude that green finance is considered in three main aspects:

1) a set of various methods to finance technological processes and projects in the field of greening economic activity;

2) a set of financial institutions (banks, insurance companies, etc.) engaged in financing environmental programs and projects;

3) financial products and services (loans, bonds, etc.) with an environmental component.

Table 1

Dynamics of green financing in the Russian Federation for 2000–2018

Year	Investments in fixed assets aimed at environmental protection and rational use of natural resources, million roubles	Share of investments in fixed assets aimed at environmental protection and rational use of natural resources in the total investment, %	Current environmental expenditures, million roubles
2000	22 338.6	1.92	76 235.6
2001	27 710.0	1.84	76 832
2002	25 270.1	1.43	89 365
2003	35 407.0	1.62	110 705
2004	41 167.6	1.44	126 560
2005	58 738.0	1.63	142 655
2006	68 188.0	1.44	133 330
2007	76 884.0	1.14	148 157
2008	102 388.0	1.16	183 905
2009	81 914.0	1.03	183 655
2010	89 093.9	0.97	193 463
2011	95 662.0	0.86	222 599
2012	116 543.0	0.92	239 170
2013	123 807.0	0.92	254 377
2014	158 636.0	1.14	269 839
2015	151 788.0	1.09	290 890
2016	139 677.1	0.95	306 534
2017	154 042.3	0.96	320 947
2018	157 651.0	0.89	345 464.1

Source: compiled by the authors.

Table 2

Clustering Russian regions by fixed capital investments aimed at environmental protection and rational use of natural resources

Cluster number	Region
I	Moscow, St. Petersburg, Tyumen region, Yamalo-Nenets Autonomous Okrug, Krasnoyarsk Territory
II	Komi Republic, Volgograd Region, Republic of Bashkortostan, Republic of Tatarstan, Perm Territory, Sverdlovsk Region
III	Leningrad Region, Irkutsk Region, Omsk Region, Republic of Sakha (Yakutia)
IV	Belgorod Oblast, Lipetsk Oblast, Arkhangelsk Oblast, Vologda Oblast, Murmansk Oblast, Orenburg Oblast, Samara Oblast, Chelyabinsk Oblast, Kemerovo Oblast, Tomsk Oblast, Primorsky Krai, Khabarovsk Krai, Sakhalin Oblast
V	Vladimir region, Voronezh region, Ivanovo region, Kaluga region, Kostroma region, Kursk region, Moscow region, Oryol region, Ryazan region, Smolensk region, Tambov region, Tver region, Tula region, Yaroslavl region, Republic of Karelia, Kaliningrad region, Novgorod region, Pskov Region, Republic of Adygea, Republic of Kalmykia, Krasnodar Territory, Astrakhan Region, Rostov Region, Republic of Dagestan, Kabardino-Balkaria, Karacha-Cherkess R Republic of North Ossetia-Alania, Chechen Republic, Stavropol Territory, Republic of Mari El, Republic of Mordovia, Udmurt Republic, Chuvash Republic, Kirov Region, Nizhny Novgorod Region, Penza Region, Saratov Region, Ulyanovsk Region, Kurgan Region, Altai Republic, Republic of Buryatia, Republic of Tuva, Republic of Khakassia, Altai Territory, Novosibirsk Oblast, Transbaikal Territory, Kamchatka Territory, Amur Oblast, Magadan Oblast, Jewish Autonomous Oblast, Chukotka Autonomy th District

Source: compiled by the authors.

DEVELOPMENT OF GREEN FINANCING IN RUSSIA

Today, the most important imperative for the sustainable development of the Russian economy is the formation of a green economy and a green financing system. However, according to the data of the Federal State Statistics Service of the Russian Federation, the

current green investments in our country are only 0.9% of the total investments in fixed assets and are insufficient for green development (*Table 1*). Moreover, in the last twenty years (2000–2018), the share of green investments in the total volume of investments in fixed assets decreased two-fold. At the same time, Russian companies tend to spend more

Table 3

Average values of investments in fixed assets aimed at environmental protection and rational use of natural resources and current environmental expenditures for the allocated clusters, million roubles

Year	Indicator value by clusters				
	I	II	III	IV	V
2000	1618.9	1100.7	263.6	294.3	65.3
2005	5222.2	1239.6	976.1	1024.0	171.8
2011	6107.9	2012.4	1302.1	2275.2	403.1
2015	9643.3	8382.3	2003.9	2357.9	392.3
2017	14 666.8	3927.4	6538.1	2184.9	390.0

Source: compiled by the authors.

Table 4

Clustering Russian regions by current environmental expenditures

Cluster number	Region
I	Murmansk Region, Tyumen Region, Krasnoyarsk Territory
II	Belgorod Oblast, Moscow Oblast, Moscow, Leningrad Oblast, Krasnodar Territory, Volgograd Oblast, Republic of Bashkortostan, Republic of Tatarstan, Perm Territory, Nizhny Novgorod Oblast, Orenburg Oblast, Samara Oblast, Sverdlovsk Oblast, Yamalo-Nenets Autonomous Okrug, Chelyabinsk Oblast, Irkutsk Oblast, Kemerovo region, Republic of Sakha (Yakutia)
III	Bryansk region, Vladimir region, Voronezh region, Ivanovo region, Kaluga region, Kostroma region, Kursk region, Lipetsk region, Oryol region, Ryazan region, Smolensk region, Tambov region, Tver region, Tula region, Yaroslavl region, Republic of Karelia, Komi Republic, Arkhangelsk region, Vologda region, Kaliningrad region, Novgorod region, Pskov region, St. Petersburg, Republic of Adygea, Republic of Kalmykia, Astrakhan region, Rostov region, R Republic of Dagestan, Republic of Ingushetia, Kabardino-Balkarian Republic, Karachay-Cherkess Republic, Republic of North Ossetia-Alania, Chechen Republic, Stavropol Territory, Republic of Mari EL, Republic of Mordovia, Udmurt Republic, Chuvash Republic, Kirov Region, Penza Region, Saratov Region, Ulyanovsk Region, Kurgan Region, Altai Republic, Republic of Buryatia, Tuva Republic, Republic of Khakassia, Altai Territory, Novosibirsk Region, Omsk Region, Tomsk Region, Trans-Baikal Cr second, the Kamchatka Territory, Primorye, Khabarovsk Territory, the Amur Region, the Magadan Region, Sakhalin Region, the Jewish Autonomous Region, Chukotka Autonomous Okrug

Source: compiled by the authors.

Table 5

**Average values of current environmental expenditures
for the selected clusters, million roubles**

Year	Indicator value by clusters		
	I	II	III
2000	4392.3	2266.2	383.7
2005	10736	3979.5	684.4
2011	16432.7	5955.2	1169.5
2015	42862.4	8085.2	1456.1
2017	21099	9256.2	1584.2
2018	20847.4	10143.3	1727.3

Source: compiled by the authors.

Table 6

Matching correlation coefficient matrix

Indicator	X1	X2	Y
X1	1.00	0.966	0.569
X2	0.466	1.00	0.993
Y	0.969	0.993	1.00

Source: compiled by the authors.

on environmental protection — more than 4.5 times.

Geographic distribution of green financing in our country is uneven. The cluster analysis of Russian regions by environmental investments helped identify five clusters (Table 2).

Moscow, St. Petersburg, the Tyumen Region, the Yamalo-Nenets Autonomous Okrug, and the Krasnoyarsk Territory (the first cluster)

lead in green investments. The second cluster (Republic of Komi, Volgograd Region, Republic of Bashkortostan, Republic of Tatarstan, Perm Territory, and Sverdlovsk Region) also has an active policy in the study area and has significant investment in fixed assets aimed at protecting the environment and rational use of natural resources. The regions of the third and fourth clusters have just

started developing a green financing mechanism. However, the regions of the largest, fifth cluster reflect the overall situation in Russia. These regions are outsiders of green financing. There is a significant gap between the leading regions and the outsider regions: in the total environmental investments, the share of the leaders is about 25%, and the share of the outsiders is only 1%.

Table 3 presents the average values of green investments in the selected clusters.

Clustering Russian regions by current expenditures on environmental protection resulted in splitting them into three clusters (*Table 4*).

Table 5 presents the average values of the expenditures of companies on environmental protection for the selected clusters.

As noted above, amid implementing the green economy concept, green financing is one of the sources for ensuring sustainable economic growth. Therefore, the authors calculated a regression model on empirical data for 2000–2018 for the relationship between the level of green financing and the pace of economic development in the country. GDP (Y) was considered as an effective indicator, and the following indicators (factors) were determined as independent variables: X_1 — investments in fixed assets aimed at environmental protection and rational use of natural resources; X_2 — expenditures of organizations on environmental protection.

Matching correlation coefficients were calculated to assess the interdependence of these indicators (*Table 6*).

The matching correlation coefficient matrix allows us to conclude that the strongest correlation exists between Russia's GDP (Y) and current expenditures on environmental protection (X_2) — $r_{yx2} = 0.993$.

The regression equation is as follows:

$$Y = -22769.6 + 0.1x_1 + 0.3x_2.$$

The coefficient of determination indicates the accuracy and exactness of the model. It suggests that 63.3% of the effective feature

variation (Y) is due to the influence of factors (X) in the model.

Coefficients of the multiple regression equation show the absolute influence of independent variables on the final effective indicator. In our case, if investments in fixed assets aimed at environmental protection and rational use of natural resources increase by 1 million roubles, Russia's GDP will increase by 0.1 billion roubles; if current expenditures of organizations on environmental protection increase by 1 million roubles, Russia's GDP will increase by 0.3 billion rubles.

CONCLUSIONS

The transition to green economic growth and the formation of a green economy are the global trend in the development of socio-economic systems. An important condition for sustainable economic growth in the green economy is the presence of a green financing mechanism to mobilize the necessary financial resources for greening and decarbonizing national economy. In our opinion, the following measures would stimulate the development of green financing in Russia:

- to develop a regulatory framework to handle the implementation of green financing;
- to develop a roadmap for green financing;
- to form a green bond market to finance environmental projects: green transport; renewable energy sources; water and forest management; reduction of carbon and environmental pollution; utilization and recycling; low hydrocarbon production. In December 2018, RSB KHMAO LLC issued first green bond with a nominal value of 1.1 billion roubles and the circulation period of up to 2031 to build a landfill for municipal solid waste disposal;
- to create a specialized banking institution, whose main activity will be lending to environmental protection projects;
- to ensure state support for environmental initiatives of private business through di-

rect budget financing (budgetary allocations; state guarantees; budget loans; subsidizing part of investors' loan charges) and to provide tax benefits and preferences (including to investors and issuers of green bonds).

Finally, we would note that the green financing mechanism in Russia is in its infancy. Today, green investments in our country are insuffi-

cient to ensure sustainable green development. Geographic distribution of green financing in the regions of the Russian Federation is uneven. For the further development of green financing in Russia, it is necessary: to form an appropriate regulatory framework; to develop and actively use new tools to finance green projects; to create a specialized banking institution.

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Authors' declared contribution:

Semenova N. N. — problem definition; analysis of existing publications on sustainable development issues, formation of a green economy and a green financial system; development of recommendations to stimulate the development of green financing in Russia.

Eremina O. I. — collection of analytical data and assessment of the current state and development trends of green financing in Russia.

Skvortsova M. A. — cluster analysis of the constituent entities of the Russian Federation by the level of green financing; building a regression model reflecting the relationship between the level of green financing and the pace of economic development in the country.

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