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# Russia's Sustainable Development Policy in Combating Climate Warming

Aleksey A. Malyshev [1][ORCID 0000-0002-1956-6712],
Nikolaj N. Solodkov [2][ORCID 0000-0003-4357-1973],
Tatyana V. Kudryashova [3*][ORCID 0000-0003-4056-3855]

[1] *Penza State Technological University, Penza, Russia*
[2] *Penza State University of Architecture and Construction, Penza, Russia*
[3] *Novgorod State University, Veliky Novgorod, Russia*
*Tatyana.Kudryashova@novsu.ru*

**ABSTRACT**
The article covers the connection between the sustainable development policy implementation and combating slowing the rate of climate warming in terms of the Russian regions' development. The purpose of the article is to determine the directions of the regional sustainable development policy in accordance with modern global challenges. Linear approaches to the "green" economy implementation have led to deep socio-economic crises in the EU countries. On the contrary, non-linear and systemic solutions make it possible to set many goals when developing programs for the Russian regions' development. The example of combating greenhouse gas emissions shows the connection between human development and the ecological footprint of economic activities. Sustainable development is understood as the ability of socio-ecological and economic systems to achieve high indicators of the population's life quality and the growth of the biological productivity of nature. The main indicators of such a policy can be described by the human development index, the ecological footprint associated with the amount of greenhouse gas emissions. The use of tools for the regions' socio-economic development aimed at organizing the use of resources that does not reduce the biological productivity of ecosystems makes it possible to adjust regional policy in terms of sustainable development. In this regard, the Sustainable Development Goals, as defined in the UN Convention of 2015, as well as under the Paris Agreement, which has also been ratified by Russia, are being achieved. National policy in these areas should cover three main levels: national, regional and enterprise level. If the "Strategy for the Socio-Economic Development of the Russian Federation with Low Greenhouse Gas Emissions until 2050" is identified at the national level, then the development strategies of the federation constituent entities should be revised, and management standards for enterprises in the field of sustainable development, parameters for greenhouse gas emissions and low-carbon technologies should be developed.

**Keywords:** *sustainable development, climate warming, regional policy, socio-ecological and economic system*

## 1. INTRODUCTION

Discussions around climate change have been going on in the scientific community for quite a long time. The question about the impact of the results of human activity on its current state was raised only in the middle of the 20th century. This was reflected in numerous studies, the results of which were presented at international conferences on environmental protection in Stockholm (1972) and Rio de Janeiro (1992). However, the publication of Michael E. Mann [1] on the change in the average temperature of the Earth over the past 1000 years can be considered the dominance of the view of anthropogenic causality of climate change. Michael E. Mann's research has formed the basis for many publications, including the work of the Intergovernmental Panel on Climate Change (IPCC). The influence of the technogenic origin of the world countries' economy development on their ecological state has been confirmed in many studies conducted in various countries. As a result, the process has

been recognized by most world countries, as evidenced by signing the international agreement on combating greenhouse gas emissions into the atmosphere – the Kyoto Protocol, which was in force from 2008 to 2020. Nowadays, the Paris Agreement, signed in 2016 under the United Nations (UN) Framework Convention on Climate Change and regulating measures to reduce carbon dioxide in the atmosphere from 2020, has become the document setting tasks in the field of combating climate change. The agreement was prepared to replace the Kyoto Protocol. 188 countries have already ratified this agreement.

In 2019, Russia ratified this agreement by the Decree of the Government of the Russian Federation "On the Adoption of the Paris Agreement". Its purpose is to reduce global temperature rise below 2°C. In this regard, the country has set the reduction of greenhouse gas emissions to the level of "70-75% 1990 by 2030, subject to the maximum possible consideration of the forests absorption capacity" as its goal [2].

In 2015, within the framework of "The 2030 Agenda for Sustainable Development" UN conference [3], the need for a transition to sustainable development was identified. At this summit, seventeen sustainable development goals (SDGs), as well as objectives and indicators for their achievement, were formulated. They replaced the Millennium Development Goals, which determined the priorities of the early 20th century for the period from 2000 to 2015. The system included 18 objectives and 48 development indicators [4].

Goal No. 13 of the Sustainable Development Goals is defined as "Take urgent action to combat climate change and its impacts." It includes three main objectives, among which only one indicator is a factor value in relation to climate change – C120202 "Total greenhouse gas emissions". At the same time, the analysis of greenhouse gas reduction should take real economic conditions into account. For example, the reduction in greenhouse gas emissions in Russia in 2017 compared to the 1990 level was of 32.4% [5]. It would seem that this is not a bad indicator in a view of the sustainable development goals. However, when interpreting this value, it is necessary to take the economic recession caused by the collapse of the USSR and the transition to market economic conditions into account.

According to IPCC for the period 2006-2015 [6], high rates of warming were observed in the countries of the northern hemisphere, the coasts of which are washed by the Arctic Ocean: Russia, Canada, Denmark, as well as the countries of Northern Europe. Here, the warming exceeded 2.25°C of the average long-term temperature for the observation period of 1850-1900. As a result, winter (from December to February) has become warmer by more than 3°C, and the atmospheric polar vortex is shifting to the southern latitudes, which leads to frequent changes of heat and cold in winter.

Russia has joined international programs to combat climate change and, like many countries, it has announced a smooth transition to sustainable development. Methodological developments on accounting for greenhouse gas emissions and their impact on climate change are being carried out by the Federal Service for Hydrometeorology and Environmental Monitoring (Rosgidromet), which is reflected in the report of the Federal State Statistics Service (Rosstat), as well as of scientific institutions such as "Yu.A. Izrael Institute of Global Climate and Ecology" (IGCE) and others. Rosstat collects SDG statistical data and develops a methodology for their collection.

## 2. MATERIALS AND METHODS

The purpose of this study is to determine the connection between the achievement of sustainable development goals and combating the climate warming rate, as well as to offer recommendations for updating the socio-economic programs of Russian regions.

In this regard, the following research objectives are identified:

1) to identify the main comprehensive indicators of socio-economic development and climate warming factors;
2) to determine the connection between measures of combating climate warming and the achievement of sustainable development goals;
3) to propose directions for adjusting the programs for the socio-economic development of Russian regions and regional policy in the field of sustainable development.

Climate change exacerbates the social and environmental problems of individual world countries. Droughts [7], shortage of drinking water [8], poverty increase and problems of hunger [9], as well as of education and health systems, culture and human rights are becoming frequent. This range of

objectives is described in the Sustainable Development Goals (SDGs), adopted, as mentioned above, by the UN General Assembly in September 2015. Unlike the previously adopted Millennium Goals, which, after the collapse of the colonial and Soviet systems, have become tools to help developing countries. The SDGs define systems of the already familiar to us developed countries of Western Europe and the United States as "developing" on the way to environmental and economic sustainability. At the same time, sustainability is not understood as the ability of socio-economic systems to overcome crisis phenomena (economic recessions, unemployment, etc.), but as the possibility of a balanced development of social, economic and ecological systems.

There are quite a few approaches to sustainability assessment [10, 11]. One of them involves the use of the ratio of two indicators to describe environmental and economic sustainability: the human potential index and the ecological footprint of the country's national economy. The first indicator reflects the degree of the socio-economic system "maturity" and includes 6 differentiation coefficients that show the standard of living, literacy, education and longevity in the country. This indicator has been published in the annual reports of the United Nations Human Development Programme since 1990.

The second indicator is the ecological footprint. This is the area of biological productivity of the territory of land and water, capable of providing the country's population with resources for producing and absorbing waste products (assimilation capacity of the territory). It is expressed in global hectares, i.e. the surface area of a territory biological productivity compared to the world average biological productivity for resource production and waste disposal. The methodology and terminology have been developed and used in the reports of the World Wide Fund for Nature (WWR) [12]. Carbon dioxide is used to calculate the ecological footprint which is formed as a result of the combustion of fossil fuels in when producing energy, services and consumer goods, and the size of the territory biological productivity necessary to absorb production waste [13]. Consumption is the difference between exports from the sum of import values and domestic consumption. For international comparison, the value of a global hectare is divided by the territory population and represents the per capita ecological footprint.

At the present stage of human development, the value of the Human Potential Index over 0.8 is considered to be high, and the ecological footprint is acceptable for the planet, when its biological productivity is capable of coping with production waste, is in the range from 0 to 2 hectares. This narrow range is an acceptable level of environmental and economic stability. Today, only Cuba corresponds to this value.

When combating climate warming, the "Take urgent action to combat climate change and its impacts" goal implies the solving the problem of "... responding to climate change in policy, strategy and planning at the national level." In turn, the C120202 "Total greenhouse gas emissions" index a is monitoring object at the individual regions and the whole country levels [14]. It represents the amount of emissions of a million tons of $CO_2$-equivalent per year and is reflected in the reports of the IGCE, as well as in the reports of the Global Carbon Project.

Therefore, the goals of sustainable development are closely interrelated and represent a multi-level complex system. Combating climate warming acceleration is an integral part of the sustainable development goals. At the same time, it is closely related to the tasks of ensuring a high level of the human potential index development and the level of the territory environmental and economic development.

## 3. RESULTS

If we compare the human potential index and the ecological footprint, we can see that none of the Russian regions meet the minimum criteria for sustainable development *(Figure 1)*. Most often, a high level of human capital is combined with a high ecological footprint, and vice versa.

In 2019, human potential index for all regions of the country was more than 0.8. The republics of Tyva and Chechnya had the lowest values – 0.808 and 0.811, respectively. The maximum values corresponded to the largest socio-economic centers of Russia – Moscow (0.959) and St. Petersburg (0.951). These are the regions with the highest development level, corresponding to the countries of Northern Europe, Japan, Israel, etc. Tyumen region and Tatarstan (0.9524 and 0.921 respectively), following the leaders of the list, are included in the regions with a very high development level. The average indicator value for the Russian Federation – 0.902 – also corresponds to this criterion. The median value is much lower – 0.871. It corresponds

to the value of such regions as Arkhangelsk, Oryol, Tambov and Volgograd regions.

In terms of the ecological footprint size (vertical axis of *Figure 1*), the Yamalo-Nenets Autonomous Okrug – 8.95 hectares per capita – is the leader of the list. This is due to the oil and gas production region specialization in the national economy of the country. The third place is occupied by St. Petersburg (7.33) and Moscow (7.1) is only in the third place. It should be noted that there is a significant gap between regions in the ecological footprint size. So, Mordovia has the lowest value – 3.46. Only Tambov region (3.65) and Chechnya (3.69) are ahead of it.

The average ecological footprint value in the Russian Federation is 5.69, and the median value is close to the average of 4.97.

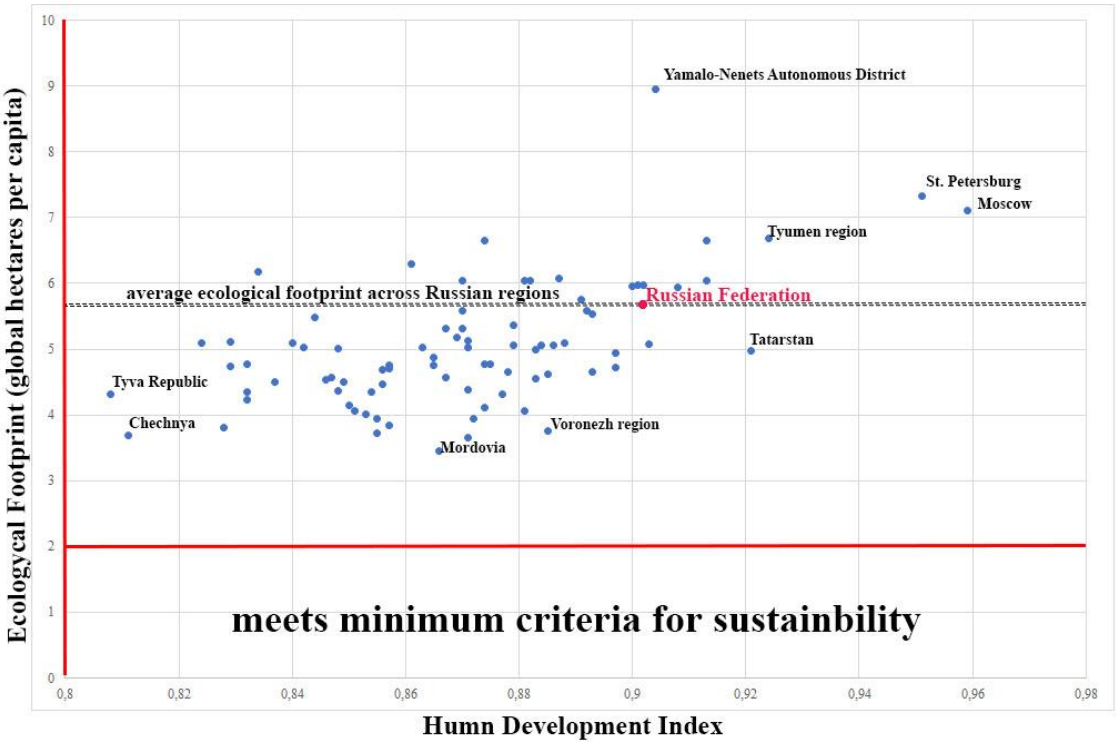


**Figure 1.** Ecological Footprint per person and HDI of Russian regions (2019) and its natural resource consumption
Source: [15]

Due to the fact that the ecological footprint represents greenhouse gas emissions, the main of which is carbon dioxide ($CO_2$), the analysis of climate warming factors will not be complete without this indicator. For the period from 1991 to 2020, there is a noticeable decrease in emissions from 2.4 billion tons to 1.58 billion tons per year [15]. This is due, among other things, to the economic recession after the collapse of the USSR.

Power industry – coal (23.20%), oil (23.82%) and gas (47.98%) – dominates in the structure of carbon dioxide sectoral production. Together they account for 94.99% of all carbonic oxide emissions. The fuelwood combustion emits 46.76 million tons of gas, or 2.79%, while the production of cement and other pollutants gives a little more than 2% of emissions.

In this regard, the distribution of the ecological footprint across the regions of Russia becomes regular: territories with the least forest cover and developed power industry are characterized by the maximum values of the ecological footprint (*Figure 2*).

However, the potential for biological productivity hides significant greenhouse gas emissions due to coal combustion at thermal power plants and metal production. This causes increased values of greenhouse gas emissions from stationary sources in Krasnoyarsk Territory and Kuzbass, and the combustion of oil and gas products in Tyumen Region and the Khanty-Mansiysk Autonomous Okrug. Increased greenhouse gas emissions are in the Ural and Siberian Federal Districts.

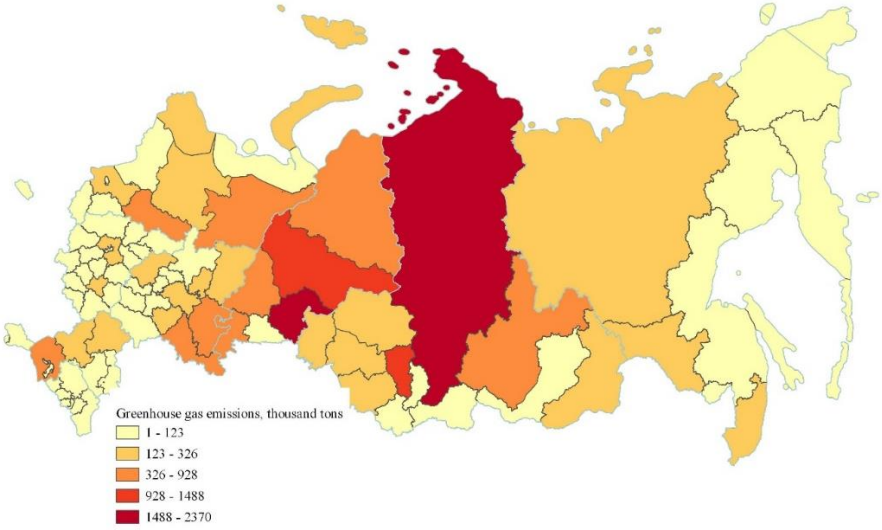


**Figure 2.** Geography of distribution of greenhouse gas emissions sources by the regions of the Russian Federation
*Source:* [15]

Therefore, there is a close connection between the anthropogenic factors of climate warming and the socio-economic development level of Russian regions. This causes the development of projects for ways of production ecologization and a systematic approach to solving socio-ecological and economic problems.

## 4. DISCUSSION

The strategic goals of the socio-economic development of the country and its individual regions require the leadership to focus on such indicators as GDP and GRP, growth indexes of macroeconomic indicators at the macro- and meso-level, growth of the economy priority sectors, ensuring the national currency stability, etc. The economic model of Russia that took shape at the beginning of the 20$^{th}$ century has shown that the price factor has a strong influence on macroeconomic indicators, causing a clear bias towards economic goals, which contradicts the postulates of sustainable development. There is a need for a non-linear revision towards a socio-ecological and economic approach to management decisions. The non-linear nature of socio-ecological and economic systems development is confirmed by the cyclical nature of the economy development [16].

In this regard, Russia's accession to the "Paris Agreement" and the adoption of the Sustainable Development Goals make it possible to develop systemic projects for the territory development. The implementation of the SDGs is closely linked to achieving the goal of reducing the warming rate to 1.5°C, which will reduce income inequality [17] and poverty problems [18]. The consequences of climate warming affect the poorest population, who lose their homes as a result of extreme weather, most of all. Yields are declining, houses and housing and communal services are being destroyed [19].

The complexity and consistency of management decisions are provided for in the order of the Government of the Russian Federation No. 3052-p dated October 29, 2021, which approves the "Strategy for the Socio-Economic Development of the Russian Federation with Low Greenhouse Gas Emissions until 2050", which correlates with global trends in the transition to carbon-neutral economy very closely [20]. In the same year, the State Duma of the Russian Federation adopted the law "On State Regulation of Greenhouse Gas Emissions". Both documents are intended to fix the dynamics of greenhouse gas emissions, the parameters of climate projects and guarantee a gradual transition to sustainable development based on low-carbon technologies.

The developed international ISO standards are also aimed at achieving the SDGs. Technical Committee ISO/TC 207 Environmental management is concerned with the development of environmental management to address negative environmental and climate impacts, including social and economic aspects. Due to the high role of cities in climate change, the ISO/TC 268 committee develops standards in the field of sustainable development of

cities and rural areas. The provisions of these standards should be also taken into account when developing a regional policy at the meso- and micro-levels.

## 5. CONCLUSION

It is possible to ensure the reduction of greenhouse gas emissions in combating slowing the rate of climate warming as part of creating sustainable development programs. At the same time, the regional policy of transition to "green" technologies should not contain forced decisions but should be aimed at creating programs for the development of socio-ecological and economic systems of individual regions of the country. The accelerated transition to alternative forms of energy is in danger of its deficit. This was shown by the EU energy crisis in autumn 2021.

There is a need to develop regional sustainable development projects that would aim to achieve SDG indicators. Production also needs to develop and approve management standards, production technologies and control of greenhouse gas emissions. Models of "cleaner" production, the introduction of resource-saving technologies and the consideration of ISO standards in the field of sustainable development can be the solution at the micro level. The solution of these problems should keep up with the development of regional strategies for sustainable development.

The development of strategies for the development of individual regions of Russia should be based on the documents mentioned above and take a complex of environmental, social, economic and managerial factors into account.

## AUTHORS' CONTRIBUTIONS

Aleksey A. Malyshev – stating the research problem; academic advising; formulation of the main concept of the study; critical analysis and revision of the text. Nikolaj N. Solodkov – preparing the text of the article; literature review on the problem under study, preparing graphic results of the study; formulation of conclusions; development of recommendations. Tatyana V. Kudryashova – preparing the text of the article; critical analysis; formulation of conclusions; editing the text of the article.

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