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GREEN TECHNOLOGIES AS AN OBJECTIVE NECESSITY

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Abstract

The research investigates the imperative shift towards green technologies as a critical necessity in the contemporary world. The primary objective is to comprehensively understand the drivers, challenges, and outcomes associated with the adoption of green technologies across various sectors. Employing a mixed-methods approach, the study combines qualitative and quantitative analyses, incorporating literature reviews, case studies, and statistical data to derive meaningful insights. The research delves into the multifaceted aspects of green technologies, exploring their environmental impact, economic implications, and societal benefits. Utilizing both primary and secondary data sources, the study analyzes the current global landscape of green technology adoption, identifies key trends, and evaluates the effectiveness of existing green initiatives. The methods include a thorough examination of policy frameworks, industry practices, and technological advancements contributing to the understanding of the challenges and opportunities in the transition to green technologies. A standout result of the research is the identification of successful green technology integration models and their positive impact on environmental sustainability and economic development. The findings emphasize the crucial role of government policies, industry collaborations, and public awareness in fostering the widespread adoption of green technologies. Additionally, the research provides evidence of the economic viability of green practices, showcasing instances where environmentally friendly technologies contribute to cost savings and long-term business sustainability.

Keywords: Ecological disaster, green technologies, green economy, resource conservation

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1. Introduction

Modern challenges to the environment create prerequisites for the introduction of new consumption models, for changing the balance in the markets of raw materials and energy resources. At this stage of economic development, the transition to greening is an objective necessity that no one doubts. The expected structural changes in the global economy are forcing the domestic economy to move in line with global trends (Chernyaeva & Pakhomova, 2020). The analysis of the existing world experience shows that the green economy has all the prerequisites to become a catalyst for the development of the national economy (Rutskiy & Osipenko, 2020). The scarcity of natural resources forces humanity to switch to the principles of resource conservation at different stages of its life. However, resource conservation is not the best way to combat the limitations of natural resources, given that even with their economical use, natural resources may end sooner or later. A more preferable way is to search for the technology of extended reproduction of resources. The above confirms the relevance of the study of the green economy as one of the priorities of the implementation of the strategy of technological development of the territory.

2. Problem Statement

The escalating environmental challenges on a global scale demand immediate attention and effective solutions. In light of this pressing concern, this article addresses the imperative of integrating green technologies into the economy as a means to mitigate environmental issues. The research aims to delve into the underlying factors, theoretical underpinnings, as well as the goals and objectives associated with the incorporation of green technologies. Furthermore, the article outlines priority measures that need to be taken to actualize the principles of the green economy, with a specific focus on the context of Russia.

3. Research Questions

These research questions delve into various aspects of green technologies and the principles of the green economy, aiming to provide a comprehensive understanding of their significance and implications.

i. Prerequisites for Introducing Green Technologies: This question seeks to identify the conditions or factors that are necessary for the adoption and implementation of green technologies within different sectors of the economy.
ii. Theoretical Foundations of Green Technologies: Here, the focus is on understanding the underlying theories and concepts that drive the development and application of green technologies, exploring the scientific, economic, and environmental principles involved.
iii. Goals and Objectives of Incorporating Green Technologies: This question aims to clarify the overarching objectives and specific goals associated with integrating green technologies into the economy, highlighting their potential positive impacts on the environment, sustainability, and overall economic development.

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These questions provide a structured approach to examining the complexities surrounding green technologies and the transition towards a more sustainable economic model.

4. Purpose of the Study

The purpose of this study is to delve into the multifaceted aspects of green technologies and their integration into the economy. Specifically, the article aims to:

i. Examine Prerequisites and Theoretical Foundations: Investigate the conditions and theoretical underpinnings essential for the adoption and implementation of green technologies.
ii. Identify Goals and Objectives: Highlight the overarching goals and specific objectives associated with incorporating green technologies into the economy, with a focus on their potential positive impact on the environment.
iii. Address Implementation Challenges: Discuss the measures needed to effectively implement the principles of the green economy in Russia, considering the unique socio-economic context of the country.
iv. Emphasize the Role of the State: Highlight the pivotal role of government intervention in fostering the adoption of environmentally efficient production methods and supporting innovative practices.
v. Raise Awareness: Increase awareness about the benefits of green technologies for environmental sustainability and underscore the necessity of regulating the uncontrolled use of natural resources.

By addressing these aspects, the study aims to contribute to a better understanding of green technologies and their potential to drive sustainable economic development while mitigating environmental degradation.

5. Research Methods

The research on green technologies and the principles of the green economy involves a comprehensive exploration of various dimensions. The following research methods and approaches have been utilized:

i. Literature Review: A thorough examination of existing literature on the green economy, sustainable development, and related concepts to establish a foundation for the study. This includes a critical analysis of international conferences, presidential decrees, national action plans, and environmental doctrines that have shaped Russia's approach to sustainable development (Smagulova et al., 2015; Vukovich, 2018).
ii. Document Analysis: A detailed scrutiny of key state documents and strategies related to environmental protection, sustainable development, and biodiversity conservation in Russia. This involves assessing the evolution of concepts and priorities from the Rio 1992 Conference to recent policies and programs (Presidential Decree of April 1, 1996; Energy strategy of the Russian Federation up to 2030; Strategy for the management of production and consumption waste until 2030).

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iii. Quantitative Data Analysis: Exploration of statistical data related to environmental trends and the decline of natural ecosystems. This includes analyzing data on vertebrate populations and freshwater species, aiming to understand the magnitude of environmental challenges and the urgency for green technological interventions (Maltais & Nykvist, 2020; Tu et al., 2020).

iv. Qualitative Analysis: In-depth qualitative analysis of the changing concepts of environmental protection and the paradigm shift towards sustainable development. This involves assessing the current state of natural capital, the need for resource-saving technologies, and the acknowledgment of the irreversible consequences of predatory use of nature.

v. Case Studies: Examination of case studies and examples of the introduction of green technologies globally and in specific regions. This provides insights into the transformative potential of green technologies in changing business models, consumer behavior, and market structures (Han & Li, 2022; Shakhgiraev, 2019).

vi. Policy and Regulatory Analysis: Evaluation of legislative and regulatory frameworks related to green technologies. This includes assessing the financial and political support mechanisms in place, understanding potential barriers for small and medium-sized enterprises, and predicting the broader market impacts of green technology adoption.

The combination of these research methods aims to offer a comprehensive understanding of the prerequisites, theoretical foundations, goals, challenges, and potential impacts of incorporating green technologies into the Russian economy.

6. Findings

The findings of the study underscore the comprehensive applicability of green technologies across various sectors of the economy, including energy, construction, agriculture, industry, and transportation. Among these sectors, the energy industry emerges as a fundamental component in transitioning towards a green economy, primarily through the adoption of renewable energy sources.

Specifically, the study highlights the significance of renewable energy sources in driving the green transition, with a focus on solar and wind energy. In 2019, the Russian Federation initiated the "Five Gigawatts" program aimed at accelerating the development of solar and wind energy infrastructure. By 2024, this program aims to achieve a significant milestone, with electricity generation from renewable sources expected to contribute approximately 1% of the total production capacity (Maksimtsev et al., 2022).

This finding underscores the pivotal role of renewable energy in diversifying the energy mix and reducing reliance on fossil fuels, aligning with the principles of sustainability and environmental conservation. The adoption of renewable energy technologies represents a crucial step towards achieving long-term environmental goals and mitigating the adverse impacts of climate change.

Furthermore, the study indicates that the successful implementation of green technologies requires strategic planning, policy support, and investment in infrastructure development. The "Five Gigawatts" program serves as a notable example of government-led initiatives aimed at fostering the transition to a more sustainable energy future.

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Overall, the findings emphasize the importance of proactive measures and collaborative efforts in promoting the widespread adoption of green technologies, ultimately contributing to the realization of a greener, more sustainable economy in Russia and beyond.

Based on the directions outlined above, it can be concluded that green technologies cover all sectors of the economy: energy, construction, agriculture, industry, transport and so on. It is worth noting here that it is the energy sector that is the basic link in the transition to the implementation of the principles of the green economy. This means, first of all, the introduction of renewable energy sources. In 2019, the Russian Federation adopted the "Five Gigawatts" program for the development of solar and wind energy, according to which by 2024 electricity generation will amount to about 1% of total production (Maksimtsev et al., 2022). Thus, let's consider the total installed capacity of renewable energy power plants in Russia in Figure 1.

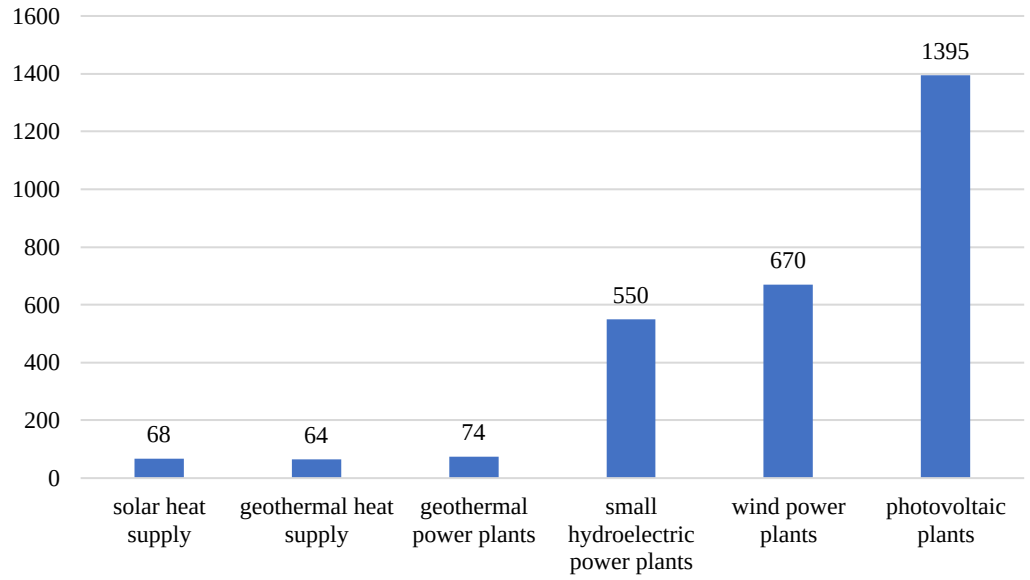

Figure 1. The installed capacity of renewable energy of the Russian Federation in MW as of January 1, 2020 (Butuzov et al., 2021)

Since 2013, the Russian Federation has been operating a renewable energy support system based on competitive selection. Having won the competitive selection, the party enters into a contract for the provision of capacity. ATS JSC annually holds such contests among investors. Investors, in turn, receive a guarantee of receiving dividends through the sale of capacities. The main criterion in the competition for the selection of RES was the level of capital expenditures per 1 kW of power. Table 1 shows the planned volume of private investment in the construction of facilities under a contract for the provision of renewable energy capacity until 2024 in billions of rubles, and Figure 2 shows the same amount expressed as a percentage. It is clear from the graphically presented material that the largest amount is directed to the construction of wind farms (59%), and the smallest amount is directed to the construction of mini hydroelectric power plants (28.2%). It is worth noting that the rate of return set at 14 percent per annum for facilities introduced before January 1, 2017 and 12 percent per annum for facilities introduced after January 1, 2017, may vary depending on the current rate of return on government long-term bonds.

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Table 1. The planned volume of private investment in the construction of facilities under a contract for the provision of renewable energy capacity until 2024 in billions of rubles (Tinkoff Journal, 2021, March 2)

Wind farms	330.73
Solar power plants	201.25
Mini hydroelectric power plants	28.20

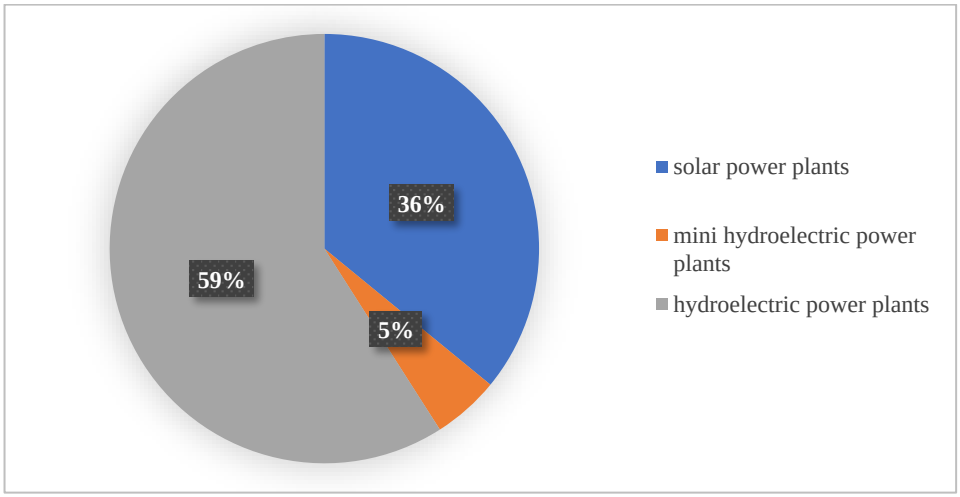

Figure 2. The planned volume of private investment in the construction of facilities under a contract for the provision of renewable energy capacity until 2024 as a percentage

Continuing to analyze the innovations in the field of green technologies introduced in the territory of the Russian Federation, it is worth emphasizing once again that it is in the energy sector that the main successes in the implementation of green technologies in various sectors of the green economy are concentrated. For example, floating solar power plants were introduced in 2020, which are more profitable compared to conventional solar power plants. First of all, because, according to numerous studies, the energy efficiency of floating power plants is 11 percent higher than that of conventional ones (Maksimtsev et al., 2022).

It is worth noting that green technologies have also become widely used in construction. The basis of green construction is that the construction of buildings is carried out with a minimum level of energy consumption, as well as with the use of environmentally friendly materials, with rational use of water and minimization of waste. Proximity to transport systems, natural lighting and ventilation are also important criteria (Bisultanova, 2021).

One of the industries in which green technologies are successfully applied is also agriculture (Figure 3). According to the basic principles of the green economy, the essence of the development of the industry in the direction of greening is the transition to organic production (Organic World, 2021, February 17). According to the data provided, for 2017-2018, the increase in land cultivated in an organic way amounted to almost 27 percent (Figure 3). As can be seen from the diagram above, the pandemic has had a significant impact on the growth of land cultivated in an organic way. Organic farming in 2020 decreased by almost 9 percent compared to 2019. However, despite the growth trends, if post-pandemic sentiments are not taken into account, the share of organic zone in the total land area in the Russian

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Federation for 2020 is only 0.3%, whereas in the USA, for example, 19.6%, Sweden – 20.4%, Austria - 26.5%.

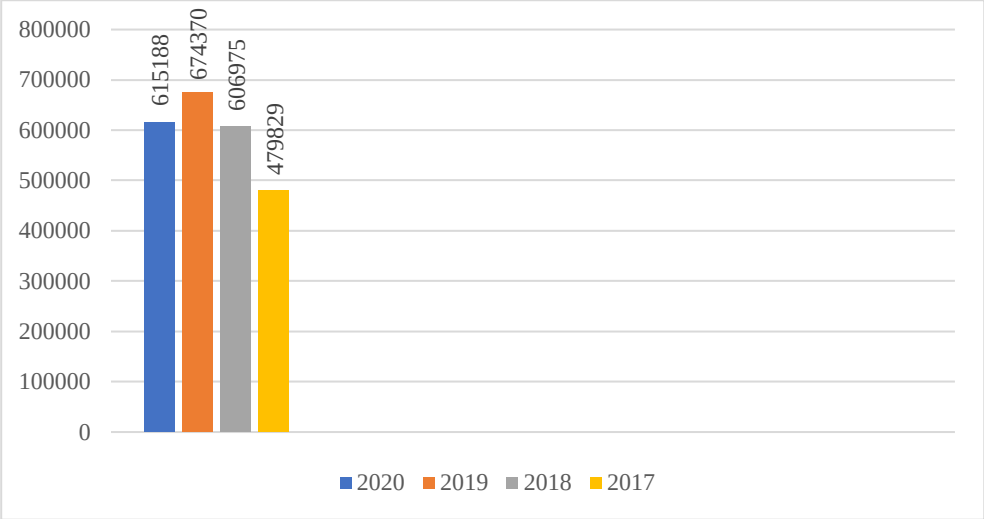

Figure 3. Organic zone in the total area of agricultural land in the Russian Federation, in ha. Compiled by the author on the basis of (Tavbulatova & Sulumov, 2020)

World experience shows that the introduction of green technologies in agriculture will help stimulate eco-business, increase the attractiveness of manufactured products. In particular, with the measures taken by the state support, it will allow developing and producing environmentally friendly products that are in high demand (Efremov & Efremova, 2021). Innovations in the field of ecology and environmental protection are one of the most important areas of economic development in the leading countries of the world, for example, in the EU.

7. Conclusions

In conclusion, the escalating environmental challenges posed by current industrial production methods highlight the imminent need for a shift towards the principles of the green economy. A consensus among governments worldwide acknowledges that continued existence on the planet relies on embracing sustainability and resource-saving practices. The concept of decoupling environmental pollution from resource consumption is gaining traction, emphasizing the necessity for both resource conservation and the implementation of technologies for expanded resource reproduction.

While the potential for the effective development of the green economy is significant, the current efforts of the Russian authorities fall short, positioning the country at lower ranks in global ratings of economic greening. To successfully implement the principles of the green economy, several critical tasks need attention at the state level:

i. Stimulate innovative enterprises engaged in cutting-edge green technologies.

ii. Introduce a system of fines and sanctions for environmentally harmful technologies, while incentivizing businesses using clean technologies.

iii. Decrease state financing of environmentally detrimental enterprises and industries.

iv. Revise environmental protection measures legislatively.

v. Implement state measures to remediate environmental damage.

Implementing these tasks poses challenges, given the prevalent high reliance on hydrocarbon raw materials in existing production systems. Reforming the production system requires attention from all stakeholders in the consumption process. Additionally, the integration of environmental and socio-economic factors into public administration is crucial for the successful adoption of green economy principles.

The state, as a catalyst for the greening process, should prioritize environmental values, even amid geopolitical tensions, sanctions, and the global economic crisis. Russia, with its favorable natural conditions, abundant resources, and strategic geographical location, has the potential to accelerate the transition to a green economy. Encouraging scientists and technologists is imperative to expedite this transition.

Furthermore, the green economy principles dictate that sustainable development and economic growth should arise from greening economic sectors. Implementing the proposed measures in Russia can enhance its geopolitical standing, global competitiveness, citizen well-being, and resilience to global risks, aligning with the principles of the green economy.

References

Bisultanova, A. A. (2021). Problems of sustainable development of the socio-ecological-economic system of the country. *AIP Conference Proceedings, 2442,* 050018. https://doi.org/10.1063/5.0075490

Butuzov, V. A., Bezrukikh, P. P., & Elistratov, V. V. (2021). Russian Energy based on Renewable Energy sources: history and modernity. *Plumbing, Heating, Air Conditioning, 8*(236), 52-57.

Chernyaeva, R. V., & Pakhomova, A. I. (2020). Parameters of the green transformation of the Russian economy: new dimensions. *Bulletin of SurGU, 3*(29), 45-55. https://doi.org/10.34822/2312-3419-2020-3-45-55

Efremov, N. A., & Efremova, M. P. (2021). Global Experience in the Use Of Green Technologies. *Oeconomia et Jus*(1), 21-30. https://doi.org/10.47026/2499-9636-2021-1-21-30

Han, Y., & Li, J. (2022). Should investors include green bonds in their portfolios? Evidence for the USA and Europe. *International Review of Financial Analysis, 80*, 101998. https://doi.org/10.1016/j.irfa.2021.101998

Maksimtsev, I. A., Kostin, K. B., Gorodilov, K. A., & Onufrieva, O. A. (2022). Development of the energy sector of the Russian Federation on the basis of innovative principles of green economy. *Issues of innovative economy, 12*(2). https://doi.org/10.18334/vinec.12.2.114809

Maltais, A., & Nykvist, B. (2020). Understanding the role of green bonds in advancing sustainability. *Journal of Sustainable Finance & Investment,* 233–252. https://doi.org/10.1080/20430795.2020.1724864.

Organic World. (2021, February 17). *The World of Organic Agriculture 2021*. https://www.organic-world.net/yearbook/yearbook-2021.html

Rutskiy, V. N., & Osipenko, M. V. (2020). Green economy as a factor of labor productivity in the manufacturing industry of the European Union countries. *Financial Journal, 4*. https://doi.org/10.31107/2075-1990-2020-4-69-84

Shakhgiraev, I. U. (2019). Green structures in the concept of sustainable development of modern cities. *Regional building complex: investment practice and implementation of PPP. Materials of the All-Russian scientific and practical conference* (pp. 376-383). Spektr.

Smagulova, Z. B., Mukhanova, A. E., & Musaeva, G. I. (2015). Analysis of the world experience of transition to a green economy: prerequisites and directions. *International Journal of Applied and Fundamental Research, 1-1,* 92-96.

Tavbulatova, Z. K., & Sulumov, I. O. (2020). Green economy as a factor of introduction of radical innovations. Spatial development of territories in the conditions of digitalization: *socio-ecological and economic systems. Materials of the All-Russian scientific-practical conference with international participation* (pp. 166-170). «Spektr» LLC. https://doi.org/10.34708/GSTOU.CONF.2021.31.82.026

Tinkoff Journal. (2021, March 2). *Overview of the Russian renewable energy market.* https://journal.tinkoff.ru/russia-green-energy/

Tu, C. A., Rasoulinezhad, E., & Sarker, T. (2020). Investigating solutions for the development of a green bond market: Evidence from analytic hierarchy process. *Finance Research Letters, 34*, 101457. https://doi.org/10.1016/j.frl.2020.101457

Vukovich, N. A. (2018). Green economy: definition and modern ecological and economic model. *Bulletin of UrFU. Series: Economics and Management, 17*(1), 128-145. https://doi.org/10.15826/vestnik.2018.17.1.006