Sustainable development of modern society while solving global problems of green technologies

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Abstract . Understanding the sustainable development of modern society and its interaction with green technologies is of great importance for solving the pressing global problems that we face today. At its core, sustainable development embodies the desire for balanced progress that meets the needs of the present without compromising the ability of future generations to meet their own needs. The relevance of studying sustainable development in tandem with green technologies lies in its potential to catalyze transformative change on a global scale. By examining the complex dynamics of social progress, resource use, and environmental protection, researchers and policymakers can identify the synergies and trade-offs inherent in achieving sustainable development goals. Moreover, understanding the socio-economic impacts of green technology adoption is essential for developing effective policies and strategies that promote inclusive growth and equitable benefit sharing. Ultimately, it is through a holistic understanding of sustainability and the strategic implementation of green technologies that we can strive to build a fairer, more sustainable and environmentally sustainable society for future generations.

1 Introduction

The desire for sustainable development in modern society is inextricably linked with the introduction and promotion of green technologies. These technologies, covering renewable energy, energy efficiency measures and circular economy models, offer ways to mitigate the impact of human activity on the environment and address pressing global challenges.

Modern society faces many interrelated challenges, including climate change, resource depletion, pollution and biodiversity loss. Energy efficiency measures, covering building design, transport systems and production processes, minimize energy consumption without compromising productivity and comfort. By adopting circular economy principles, waste is minimized and resources are continually returned to production, minimizing their extraction and accumulation in landfills [8].

The implementation of green technologies requires a multifaceted approach. Technological innovation plays a critical role in making these solutions more efficient, accessible and scalable.

2 Materials and methods

At the present stage, the study of green technologies in order to develop and implement innovative solutions to ensure the preservation of natural ecosystems in Russia includes a variety of methods and approaches aimed at analyzing and understanding innovative solutions in the field of environmental protection and sustainable use of natural resources.

The monitoring and assessment methodology in the process of introducing innovative solutions in order to ensure the preservation of natural ecosystems in Russia includes the collection and analysis of data on the state of the environment, changes in biodiversity, as well as the impact of human activities on ecosystems [7].

Another important method in the study of our topic is the use of mathematical models and computer simulations to predict changes in ecological systems under various scenarios of climate change or the impact of human activity.

3 Results

The theory of innovation in the field of green technologies is a new development model proposed in the form of the implementation of new development concepts. Let's consider the theories of green technological innovation, their content and characteristics.

"Green technology" is an umbrella term for a wide range of technologies and practices that can be used to minimize environmental impact. Green technological innovation is intended to promote green development and promote the harmonious coexistence of man and nature. Green technologies help reduce energy and water consumption, reduce waste, reduce carbon emissions and improve business efficiency by reducing costs while improving product design and creating new jobs.

Green scientific and technological innovation is scientific and technological activity that protects human health and the environment, ensures efficient and high-quality economic activity, and ensures environmentally friendly production and promotes good environmental development. The difference between green technology innovation and traditional technology innovation is that it integrates green development concepts into scientific and technological innovation, and also combines two new development concepts: green and innovation. imbalance problems and effectively reduce pollution and consumption, greatly improve productivity, and take into account the real problems of environmental development to protect people's health and the sustainable survival of mankind [1].

Science and technology are not only productive forces, but also “the driving force of history and the force of revolution.” Marx affirmed the social role of science and technology, believing that science and technology not only play a decisive role in the development of production, but are also the driving force of social history. Science and technology that maintains ecological stability and balance will provide key assistance in this process and provide effective measures to build a community with a common destiny for humanity [4].

Green technological innovation includes two aspects: technological innovation and management innovation. Green manufacturing technology innovations mainly include technological innovations in green product design, materials, processes, equipment, technology and packaging.

Green technology innovation adopts the open collaboration model, industry-university-research collaboration, functional collaboration, government-led innovation or spillover innovation, etc., and promotes green technology innovation through the creation of public platforms and complete information management [8].

The number of investors interested in green technologies is expanding. In 2023, the number of unique investors investing in at least one company was more than double the level in 2018.

As an assessment of the use of green technologies in the sustainable development of society, including in the world and in the Russian Federation, the following statistics can be cited.

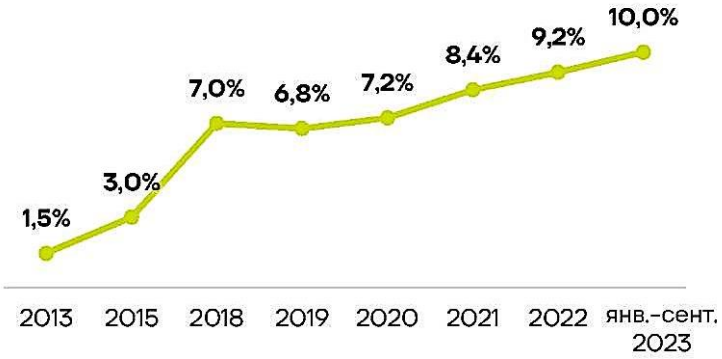

Figure 1 Share of green technologies in the total volume of world investments in the Russian Federation

Thus, the total volume of investments in green technologies has been growing over the past 10 years. Despite the general decline in investment activity in the world in 2022, it increased to 10%. Moreover, the rate of decline in investments in GreenTech is lower than in the investment market as a whole, and the number of investors who are interested in green technologies is growing steadily.

The structure of Russian GreenTech investments (see Fig. 3) is radically different from the world: about 80% is in transport, mainly sharing services, electric transport and charging infrastructure. In second place is the production of materials, where almost all investments are attracted by developers of agricultural technologies that increase productivity and the volume of food resources (vertical farms, precision farming) [4].

4 Discussion

In our view, to achieve the goal of green and sustainable socio-economic development through the green technology innovation initiative, it is important to adhere to and implement green technology policies that provide a path and motivation based on four pillars to continuously ensure good quality and a healthy environment. These four pillars are as follows.

1. Energy: Strive to achieve energy independence and promote efficient use.
2. Environment: Preserve and minimize environmental impact.
3. Economy: promoting national economic development through the use of technology.
4. Social: improving the quality of life for everyone.

Green technologies refer to products, processes or systems that satisfy the following criteria:

1. The technology must be capable of reducing the degradation of natural resources and environmental segments.

2. The technology must emit no or very little greenhouse gases (GHGs) to be safe to use and contribute to a cleaner, healthier environment for all forms of life.

3. The technology must be capable of reducing the consumption of natural resources and energy.

4. Technology should be based on an integrated approach to renewable resources.

Green technologies are receiving increasing attention from people and organizations seeking to implement initiatives that have beneficial social and environmental impacts.

Currently, the environmental problem is interpreted by scientists as an imbalance in the relationship between man and nature, caused by limited opportunities to influence the process of deterioration of the environmental situation [5, p. 260].

The green economy is alternative sources and methods of development, using gentle technologies in the sphere of human life.

Existing problems in the environmental sphere determine the objective need to search for measures to stabilize the situation. One of such measures can be called the use of “green” technologies.

Many countries around the world have switched to the use of green technologies in production through the use of alternative methods of generating energy, recycling plastic, etc.

The "green economy" acts mainly as a facilitator for the introduction of sustainable technologies in areas of activity that have a human footprint. As part of this economy, the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals were adopted globally in 2015. The main message of these goals is to eradicate poverty throughout the world along with increasing economic growth while addressing environmental problems [3].

Thus, the goals of sustainable development are the transformation of existing methods of production and consumption towards those that are gentle in terms of anthropogenic impact.

It is also necessary to note the fact that green technologies are an opportunity to adequately solve the main problem of the economy - meeting unlimited needs with limited resources through their effective use.

This means that existing methods of protecting the environment today are included in the directions of the green economy. Areas of environmental protection through green technologies include an emphasis on the legislative framework, including tax payments for the use of natural objects, and the introduction of green technologies into production processes.

A serious problem for humanity is dependence on gadgets, which mediates the emergence of many other problems, such as a decrease in human physical activity, leading to obesity, as well as problems with vision, spine, cervical spine, etc. This problem is associated with addiction and is treated along with alcoholism, smoking and drug addiction. The term “computer addiction” has been used since 1990, after the active spread of computer technology began.

Simplifying life through the use of phones has serious costs in terms of visual health of the population. Visual impairment in 60% of the country's adolescents and schoolchildren is a consequence of the population's use of telephones.

The cause of obesity is not only a sedentary lifestyle due to the use of computers and phones, but also poor nutrition. Nutrition of people is a basic human need, on which all other needs are based, and it is the attempt to satisfy this need that bears the main anthropogenic burden on the environment.

The most important problem on a global scale has been and remains the problem of unlimited needs with limited natural resources. By nature, the more a person consumes, the more he feels the need for something; this determines the task of producing goods for the economy of any country. And the purpose of goods is to satisfy needs.

The main problem is also the problem of disproportionate distribution of resources, since in some parts of the world people suffer from obesity, while in others they go hungry. There are resources on the planet that can satisfy the needs of billions of people, but to do this we need to learn how to use them wisely and rationally.

The green economy is precisely aimed at solving the problem of limited resources and their rational use. It will not be able to solve it completely, since exhaustible resources cannot be made renewable, but they can be used rationally using green technologies. Today, as already noted, alternative methods of obtaining energy are used, already used products are processed, and the production process is started in the second round, without spending new resources - a completely new product is obtained from already used resources [2].

5 Conclusion

Thus, based on the results of the analysis, certain conclusions can be drawn.

1. The concept of green economy appeared as a response to environmental problems in the world

2. At the end of the 20th century, the concept of “green economy” appeared, implying alternative sources and methods of development, using gentle technologies in the sphere of human life.

3. “Green” technologies are tools for implementing the directions of the green economy and sustainable development goals, adopted by all countries of the world as a vector of development.

4. The most important problem on a global scale has been and remains the problem of unlimited needs with limited natural resources.

5. The concept of “green economy” and the use of “green” technologies do not solve the problem of limited resources, since many resources are not renewable. But “green” technologies make it possible to create new resources that are close in properties and functions to natural ones and, thus, saving the limited available resources, satisfy people’s needs.

In addition, the integration of green technologies into urban planning and infrastructure development is critical. Sustainable cities prioritize energy-efficient buildings, green spaces and integrated transport systems that reduce dependence on private vehicles. Smart grids optimize energy distribution, and green infrastructure such as urban forests and permeable pavements improve stormwater management and mitigate the urban heat island effect [4].

In conclusion, sustainable development of modern society requires a paradigm shift towards green technologies. By embracing innovation, fostering collaboration, and prioritizing environmental stewardship, we can pave the way for a future in which economic prosperity and environmental well-being are mutually reinforcing, ensuring a healthy planet for future generations.

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