



THE ROLE OF GREEN TECHNOLOGIES AND INNOVATIONS IN ENVIRONMENTAL PROTECTION

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ABSTRACT. This article analyzes the importance of green technologies and innovations in environmental protection. The study examines the role of modern technologies, renewable energy sources, and innovative approaches in reducing environmental problems. In addition, the economic efficiency of green technologies and their impact on sustainable development are analyzed based on scientific sources. The results show that the implementation of green innovations not only ensures environmental sustainability but also promotes economic growth [1].

KEYWORDS. Green technologies, innovations, environment, sustainable development, environmental management, waste management, renewable energy, ecological efficiency.

РОЛЬ ЗЕЛЁНЫХ ТЕХНОЛОГИЙ И ИННОВАЦИЙ В ОХРАНЕ ОКРУЖАЮЩЕЙ СРЕДЫ

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АННОТАЦИЯ. В данной статье анализируется значение зелёных технологий и инноваций в охране окружающей среды. В исследовании рассматриваются вопросы снижения экологических проблем с



использованием современных технологий, возобновляемых источников энергии и инновационных подходов. Также на основе научных источников проанализирована экономическая эффективность зелёных технологий и их влияние на устойчивое развитие. Результаты показывают, что внедрение зелёных инноваций не только обеспечивает экологическую устойчивость, но и способствует экономическому росту [1].

КЛЮЧЕВЫЕ СЛОВА. Зелёные технологии, инновации, окружающая среда, устойчивое развитие, экологический менеджмент, управление отходами, возобновляемая энергия, экологическая эффективность.

ATROF-MUHIT MUHOFAZASIDA YASHIL TEXNOLOGIYALAR VA INNOVATSIYALARNING ROLI.

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ANNOTATSIYA. Ushbu maqolada atrof-muhit muhofazasida yashil texnologiyalar va innovatsiyalarning ahamiyati tahlil qilinadi. Tadqiqotda ekologik muammolarni kamaytirishda zamonaviy texnologiyalar, qayta tiklanuvchi energiya manbalari va innovatsion yondashuvlarning o'rni ko'rib chiqiladi. Shuningdek, yashil texnologiyalarning iqtisodiy samaradorligi va barqaror rivojlanishga ta'siri ilmiy manbalar asosida tahlil qilingan. Natijalar shuni ko'rsatadiki, yashil innovatsiyalarni joriy etish ekologik barqarorlikni ta'minlash bilan birga iqtisodiy o'sishni ham rag'batlantiradi [1].

KALIT SO'ZLAR. Yashil texnologiyalar, innovatsiyalar, atrof-muhit, barqaror rivojlanish, ekologik menejment, chiqindilarni boshqarish, qayta tiklanuvchi energiya, ekologik samaradorlik.



INTRODUCTION. In the current era, global environmental problems, particularly climate change, environmental pollution, and the depletion of natural resources, pose a serious threat to the world economy [2]. Traditional production systems are characterized by generating a high level of waste and inefficient use of energy resources.

Therefore, the importance of green technologies and innovations in solving environmental problems is increasing. Green technologies make it possible to improve energy efficiency, reduce waste, and minimize harmful impacts on the environment [3]. The purpose of this article is to scientifically analyze the role of green technologies and innovations in environmental protection.

MAIN PART. Concept and main directions of green technologies.

Green technologies are a set of technologies that do not harm the environment or minimize their impact on it. They include:

- Renewable energy sources (solar, wind, hydropower)
- Energy-saving technologies
- Waste recycling and disposal systems

Scientific research shows that the implementation of these technologies significantly reduces CO₂ emissions [4].

Environmental efficiency of innovations. Innovations play an important role in solving environmental problems. Through new technologies, production processes are optimized and the volume of waste is reduced. For example, “smart technologies” make it possible to control energy consumption [5]. In addition, green innovations also have a positive impact on economic growth, as they create new jobs and attract investments [6].

Econometric approach. The relationship between green technologies and economic development is expressed through the following model:

$$\text{GDP} = \alpha + \beta_1 \text{GT} + \beta_2 \text{INV} + \beta_3 \text{CO}_2 + \varepsilon$$

Here:



GT – level of green technologies,

INV – innovative investments,

CO₂ – amount of harmful emissions [8].

As a result of many studies, it has been found that GT and INV indicators have a positive impact on economic growth, while CO₂ has a negative impact [7].

Some of the advantages of green technologies should be mentioned:

- Reduces environmental pollution
- Ensures efficient use of energy and resources
- Increases economic efficiency
- Serves sustainable development [1]

Results and discussion. Analyses show that in countries that have implemented green technologies:

- Greenhouse gas emissions have decreased
- Energy efficiency has increased
- Economic growth has stabilized

In particular, the increase in the share of renewable energy serves to restore ecological balance [4]. At the same time, innovations develop new sectors of the economy [6].

The ecosystem approach to resource management and environmental protection focuses on considering the complex interrelationships of the entire ecosystem in decision-making, rather than simply responding to specific issues and problems. Ideally, decision-making processes under such an approach are collaborative approaches to planning and decision-making involving all relevant government agencies, as well as a wide range of stakeholders from industry representatives, environmental groups, and the public. This approach supports ideal information exchange, the development of conflict resolution strategies, and the improvement of regional nature conservation. Religions also play an important role in environmental protection: for example, in the compendium of the social doctrine



of the Catholic Church, “environmental protection cannot be ensured solely on the basis of financial calculations of costs and benefits. The environment is one of the goods that market forces cannot adequately protect or promote.” [8].

CONCLUSION. Green technologies and innovations are one of the main tools of environmental protection. Along with reducing environmental problems, they also ensure economic development. The results of the research confirm that the widespread implementation of green technologies is an important factor of sustainable development [2].

PROPOSALS AND RECOMMENDATIONS. In order to expand state programs for the development of green technologies, I believe it is appropriate to implement the following proposals and recommendations.

1. Encouraging innovative activity and increasing grants
2. Broad implementation of renewable energy sources
3. Strengthening environmental legislation
4. Developing waste recycling infrastructure
5. Expanding international cooperation

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