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GREEN TECHNOLOGIES IN CONSTRUCTION AND HOW ECO-BUILDING HELPS FIGHT CLIMATE CHANGE IN UZBEKISTAN

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A R T I C L E I N F O.

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Abstract

This article is dedicated to exploring the role of green technologies in construction in Uzbekistan and their impact on climate change mitigation. It examines key aspects of eco-building, including the use of renewable energy sources, eco-friendly building materials, energy-saving technologies, and water management systems. Special attention is given to the President of the Republic of Uzbekistan's decree draft, which envisions the implementation of green projects in various sectors of the economy starting in 2025. These measures are expected to reduce greenhouse gas emissions, enhance energy efficiency, and improve environmental quality. The article highlights the importance of strategic decisions aimed at creating a sustainable ecological system and adapting to climate changes in Uzbekistan.

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Introduction

Climate change is one of the most pressing global issues humanity faces today. In recent decades, the Earth's temperature has risen significantly, leading to extreme weather events, water shortages, ecosystem disruptions, and a decline in quality of life. Construction, as one of the major sectors of the economy, is a significant source of greenhouse gas emissions and resource consumption. However, it is in this sector where the introduction of green technologies can play a key role in addressing climate change. Uzbekistan, as a developing country in Central Asia, is actively striving to adopt eco-building and sustainable practices in the construction industry, helping to reduce environmental impact and foster more sustainable development.

Relevance

Climate change has led to problems such as increased dust storms, glacial degradation, soil salinization, and sudden floods. In the past 10 years, the average temperature growth rate in Uzbekistan has been 0.29 degrees Celsius, which is twice as fast as the global warming rate. This is exacerbating the water shortage, which, according to forecasts, may reach 7 billion cubic meters by 2030 and 15 billion cubic meters by 2050. In response to these challenges, Uzbekistan plans to implement "green projects" starting in 2025 aimed at adapting to climate change and promoting sustainable development. Including such projects across various sectors of the economy will help reduce negative environmental impacts and resource depletion, including reducing greenhouse gas emissions, improving energy efficiency, and enhancing air and water quality.

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Materials and Methods

To assess the effectiveness of green technologies in construction in Uzbekistan, a comprehensive evaluation of existing projects, the use of eco-friendly materials, and innovative solutions was conducted, as well as the impact of these methods on climate change. The main research methods included analyzing data on carbon dioxide emissions, water and energy consumption, and reviewing best practices and successful eco-building projects in Uzbekistan.

Literature Review

To develop the topic of green technologies in construction in Uzbekistan and their role in fighting climate change, a study of relevant sources was conducted, covering both global trends and specific issues in Central Asia and Uzbekistan. The literature review identified key areas where the adoption of green technologies is active and has a significant impact on improving environmental sustainability.

1. Theoretical Foundations of Green Building

The literature on eco-building and green technologies primarily emphasizes the importance of a sustainable approach to construction, which includes using eco-friendly materials, energy-efficient solutions, and renewable energy sources (Isaeva, L. A., Kovalenko, A. V., 2019). Leading authors in this field note that such practices minimize environmental impact, reduce the carbon footprint, and promote more efficient use of natural resources.

2. The Role of Energy Technologies and Renewable Energy Sources

The Ministry of Energy of the Republic of Uzbekistan (2023) outlines specific steps to develop renewable energy sources in the country, including solar and wind installations. According to this source, integrating these technologies into Uzbekistan's construction sector will significantly reduce dependence on traditional energy sources and help meet greenhouse gas reduction targets. This aligns with global practices, such as in the European Green Deal, which emphasizes supporting green projects aimed at reducing carbon emissions and improving energy efficiency (European Commission, 2019).

3. Environmental and Economic Aspects of Green Building

Foreign literature, such as reports from the World Green Building Council (2022) and the UN Environment Programme (2021), explores the economic benefits and long-term effects of adopting green technologies. Examples from China and Kazakhstan show how both government and private investments in green projects can not only increase energy efficiency but also create jobs in eco-friendly industries. This supports the view that a "green" economy is not only environmentally but also economically beneficial (World Green Building Council, 2022).

4. Specifics of Applying Green Technologies in Uzbekistan

In the context of Uzbekistan, literature (Kabulov, A. K., Zaripova, M. S., 2020) highlights several factors hindering the widespread adoption of green technologies. The main obstacles are the high initial costs of eco-solutions and the lack of awareness among construction companies about the potential of green technologies. However, according to the President of Uzbekistan's decree draft (2023), it is planned to integrate green components into 10% of new investment projects starting from 2025, which will stimulate growth in this sector.

5. Impact of Climate Change on the Construction Industry

Studies on climate change and its effects on agriculture and construction in Uzbekistan (Sharafutdinova, N. V., 2021) emphasize that the region is already experiencing noticeable consequences of climate change. Rising temperatures and reduced water resources require the adoption of more sustainable construction methods and water-saving technologies. In this context, eco-building can become an important tool for adapting to these changes.

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6. **International Practices and Integration into the Global Network**

Internationally, there is growing attention to climate change and the transition to a green economy. Europe and China are actively implementing green technologies and building resilient economies based on them. This is significant for Uzbekistan, as it can integrate the successful practices of these countries into its construction practices to accelerate the transition to eco-friendly building and sustainable development (UN Environment Programme, 2020).

The review of existing sources shows that eco-building and the adoption of green technologies in Uzbekistan's construction industry are crucial steps toward sustainable development and climate change adaptation. The use of renewable energy sources, energy-saving technologies, and eco-friendly materials will not only improve quality of life but also fulfill international commitments to reduce greenhouse gas emissions. It is vital that these projects receive support at the government level and are accompanied by corresponding educational and investment initiatives.

Key Data on Greenhouse Gas Emissions in Uzbekistan:

- 76.3% of greenhouse gas emissions in Uzbekistan come from the energy sector (including construction).
- 17.8% of emissions come from agriculture.
- 4.5% from industry.
- 1.4% from waste management.
- Uzbekistan's share in global greenhouse gas emissions is 0.3%, or 189 million tons. **Source:** Ministry of Ecology, Environment, and Climate Change of Uzbekistan, 2020-2021.

Results

1. **Implementation of Solar and Wind Technologies in Construction**

One of the key steps towards sustainable construction is the use of renewable energy sources. Uzbekistan is actively developing projects related to installing solar panels and wind turbines in buildings, which significantly reduces traditional energy consumption and carbon dioxide emissions.

2. **Use of Eco-friendly Construction Materials**

Eco-friendly materials, such as recycled and secondary materials, can significantly reduce environmental harm. Uzbekistan has begun using such materials in the construction of residential and commercial buildings.

3. **Energy-saving Technologies and Insulation of Buildings**

The introduction of energy-saving technologies in construction reduces energy consumption and improves living comfort. Uzbekistan is adopting building insulation technologies, including the use of double-glazed windows with low thermal transmission, which helps reduce heating and cooling costs.

4. **Water Resource Management Systems**

Given the water scarcity in Uzbekistan, efficient use of water resources is crucial. Implementing rainwater harvesting systems, greywater recycling, and low-consumption water supply and drainage systems in buildings helps reduce pressure on water resources.

5. **Green Roofs and Vertical Gardens**

The concept of green roofs and vertical gardens is actively being used in large projects in Tashkent and other Uzbek cities. These solutions improve indoor microclimates and contribute to better air quality and the fight against urban heat islands.

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Discussion

The adoption of green technologies in Uzbekistan's construction industry is significantly reducing environmental impact. However, for these technologies to be widely adopted, several barriers need to be overcome: lack of awareness among builders and clients, high initial costs of implementation, and the scarcity of local producers of eco-friendly building materials.

According to the President of Uzbekistan's decree draft, starting in 2025, 10% of new investment programs and projects must include a "green component." This figure will increase to 25% by 2027 and 50% by 2030, encouraging the broad adoption of eco-friendly technologies in construction and other sectors.

Conclusion

Green technologies in construction play a crucial role in combating climate change and ensuring sustainable development in Uzbekistan. The implementation of eco-friendly materials, renewable energy sources, and energy-saving solutions in construction will help reduce greenhouse gas emissions and improve urban quality of life. However, for eco-building to become an integral part of the construction sector, conditions must be created for the active implementation of these technologies at all levels—from the development of legislative norms to raising awareness among citizens and investors.

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