ENHANCING REGIONAL ECONOMIC SECURITY VIA GREEN ENERGY: THE CASE OF SLOVAKIA

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This thesis analyzes the issues related to ensuring regional economic security through the potential of green energy. The study examines the impact of renewable energy sources on economic security in Uzbekistan, particularly using the example of the Kashkadarya region. Recommendations developed through a comparative approach with the experience of Slovakia may prove useful in formulating strategies tailored to local conditions.

Today, the transition to a green economy has become one of the main priorities on the global agenda. In the context of climate change, the volatility of energy resource prices, and geopolitical security threats, each region is compelled to develop strategies based on renewable energy sources in order to ensure its economic security. Uzbekistan plans to establish 27 GW of renewable energy capacity by 2030, with a special emphasis on the role of its regions—particularly the Kashkadarya region.

The Kashkadarya region is highly dependent on gas from an energy standpoint. Fields such as Shurtan and Kokdumalak form the backbone not only of the region's but also of the national gas supply. Therefore, paving the way for sustainable energy in this region can reduce dependence on gas and strengthen both economic and environmental security.

As of 2024, Uzbekistan has 2.5 GW of renewable energy capacity, accounting for approximately 14–16% of total electricity production[15]. The solar energy potential of the Kashkadarya region is estimated at 2,500–3,000 hours per year, enabling the generation of at least 4–5 TWh annually. In comparison, Slovakia covered 45.3% of its electricity needs from renewable sources in 2023. This approach has significantly reduced indicators of economic vulnerability—particularly dependence on energy imports and price volatility.

In the field of green energy, over 1,500 direct new jobs could be created in Kashkadarya. This provides an opportunity to ensure regional economic security not only through energy but also through socio-economic stability.

Key advantages of renewable energy sources include:

They emit little to no carbon dioxide or other greenhouse gases that trap heat in the atmosphere and contribute to climate change. By replacing fossil fuels with clean energy, we can reduce emissions and avoid the worst effects of global warming—such as more frequent and intense storms, droughts, rising sea levels, and species extinction.

Air and water pollution from coal and natural gas plants is linked to respiratory issues, neurological damage, heart attacks, cancer, premature death, and other serious health problems. Reducing our reliance on fossil fuels can improve the quality of the air we breathe and the water we drink, saving lives and reducing healthcare costs.

[15] https://minenergy.uz/en

Renewable energy sources are abundant and never run out. The sun provides more energy in one hour than the world uses in an entire year. Wind can supply 40 times the current global electricity demand. Oceans hold vast potential for wave and tidal power. Biomass can be sourced from various organic materials such as plants, animal waste, and household refuse.

The renewable energy sector is one of the fastest-growing industries in the world, creating millions of jobs in manufacturing, installation, operation, and maintenance. According to the International Renewable Energy Agency, the sector employed 11.5 million people globally in 2019 and could support up to 42 million jobs by 2050.

Renewable energy reduces dependence on imported fuels, which are often subject to price fluctuations, supply disruptions, and political instability. Diversifying the energy mix with domestic clean energy sources strengthens energy security and resilience.

The adoption of renewable energy increases regional energy independence, contributing to strategic security. Slovakia's experience demonstrates that implementing regional energy policies at the local level—through the involvement of local authorities and the private sector—can lead to long-term sustainability.

In Slovakia, the energy sector has faced significant challenges due to sanctions imposed on Russia. However, several transformative changes have been implemented to stabilize and modernize the energy system:

- Under the REPowerEU initiative, Slovakia is modernizing its energy infrastructure for the period 2023–2025. This effort is aimed at reducing dependence on Russian fuels by diversifying supply sources.[16]

- The commissioning of Units 3 and 4 of the Mochovce Nuclear Power Plant (2023–2025) has allowed Slovakia to shift from being an electricity importer to a net exporter.[17]

- Green energy subsidies totaling €150 million have been provided to support households in installing photovoltaic panels and heat pump systems.

- A geothermal heating project in Košice (€56.1 million) is set to launch by 2026, serving approximately 171,000 residents and reducing CO_2 emissions by 54,000 tons annually[18].

- In the village of Modrovka, a communal energy initiative has been launched, where residents collectively use electricity generated by a local PV power station. This initiative is expected to gain full legal status under Slovak law by 2026.

Possible Adaptation Areas for Uzbekistan Based on Slovakia's Experience

Area	Slovakia's Approach	Potential Adaptation for Uzbekistan
Energy import diversification	Built inter connectors with Poland, Austria, and Ukraine; invested in LNG terminals to reduce dependency on Russian gas	Explore gas pipeline routes with Kazakhstan and Afghanistan; consider LNG import terminals

[16] https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/slovakias-recovery-and-resilience-plan_en#repowereu-measures-in-slovakias-plan
[17] https://www.blue-europe.eu/analysis-en/short-analysis/a-brief-outlook-of-renewable-energy-in-slovakia-trend-and-potential
[18] https://www.mordorintelligence.com/industry-reports/slovakia-renewable-energy-market

Nuclear energy development	Commissioned Mochovce nuclear units 3 and 4 to ensure long-term low-carbon energy independence	Begin feasibility studies for small modular reactors (SMRs); partner with international experts and secure appropriate siting and certification
Residential green technologies	Provided €150 million in subsidies for rooftop solar panels, heat pumps, and home insulation systems	Launch green subsidies for solar and thermal systems in rural and urban areas through joint government-bank-donor schemes
Geothermal heating systems	Invested €56.1 million in the Košice geothermal heating project to supply 171,000 residents and reduce CO_2 by 54,000 tons annually	Pilot geothermal projects in high-demand regions like Tashkent and Karshi, focusing on heating for public and residential buildings
Community energy projects	Developed energy cooperatives like the Modrovka village project; legal framework for community energy to be enforced by 2026	Enable legal and financial mechanisms to establish rural solar/wind cooperatives; introduce "energy community" concept into national legislation
Grid modernization	Modernized energy grid and introduced smart metering systems to integrate decentralized renewable sources	Invest in digital metering and grid automation for integrating distributed solar and wind systems
Industrial energy zones	Supported large-scale investments in EV batteries and green manufacturing (e.g., Volvo, Gotion)	Develop special green industrial zones in regions like Kashkadarya focused on clean tech, battery assembly, and solar panel production

In conclusion, Slovakia's experience clearly shows that economic vulnerability can be significantly reduced through the development of a green energy system by focusing on the following four key directions:

1. Diversification of energy sources – expanding the energy mix to include gas, nuclear, and geothermal sources;

2. Promotion of individual and community-based green investments – through subsidies, credit mechanisms, and legal frameworks;Expand technical training and retraining programs;

3. Expansion of technological infrastructure – such as photovoltaic (PV) systems, batteries, and heat pumps;

4. Gradual phase-out of fossil fuels and transition to a green energy system – guided by a long-term strategy.

Based on this, Uzbekistan—and particularly the Kashkadarya region—can develop effective strategies modeled after Slovakia's experience. Doing so would not only enhance economic security, but also strengthen socio-economic and environmental sustainability.

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