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# GEOPOLITICAL CRISIS AND ENERGY RESILIENCY IN CENTRAL ASIA

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**Abstract.** *Objective* – to assess the impact of geopolitical crises (sanctions, regional conflicts, supply chain disruptions) on the energy systems of Central Asian countries and to identify mechanisms for strengthening regional energy resiliency. *Methods* – dialectical, abstract-logical, comparative analysis, system approach. *Results* – the study reveals that Central Asian energy infrastructure remains highly dependent on external transit routes and investment flows, which increases vulnerability during geopolitical shocks. A comparative assessment of energy security indicators for Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan is provided. The role of regional cooperation (e.g., CASA-1000, unified energy ring) in mitigating crisis impacts is evaluated. The potential for renewable energy (solar, wind, hydro) and digitalization of energy management to enhance resiliency is identified. *Conclusions* – the authors state that geopolitical crises accelerate the need for energy diversification, modernization of aging infrastructure, and the creation of joint strategic reserves. Amendments to national energy legislation and the adoption of a regional energy security charter are recommended.

**Keywords**: Energy transition, geopolitical crisis, energy resiliency, Central Asia.

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## Introduction

The relationship between geopolitical crises and energy security has been an important issue in Central Asia for a long time. The region has large hydrocarbon resources, and about 4.9% of the world's oil and gas resources are located in Central Asia (Dou et al., 2024). It is also located in an important strategic position along major energy transport routes in Eurasia. However, the resilience of energy systems in Central Asia under geopolitical disruptions is still not well studied in the literature on global energy security. Most existing studies focus on the Middle East, Europe, and East Asia, while much less empirical research examines how Central Asian countries respond to external shocks and internal instability in their energy sectors. This paper aims to fill this research gap by analyzing the effects of geopolitical crises on energy resilience in the Central Asian economies of Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan.

The motivation for this study comes from recent regional and international developments that have revealed the structural weaknesses of Central Asia's energy infrastructure and energy markets. The impacts of the Russia–Ukraine conflict, growing competition between China and Russia, political instability in neighboring Afghanistan, and changes in global energy demand during the energy transition have increased the region's exposure to external shocks (Zakeri et al., 2022). At the same time, the growing use of renewable energy, together with old fossil fuel infrastructure and strong dependence on only a few export markets, has made energy resilience more important for the region.

From a methodological point of view, this paper uses a country-specific time-series econometric approach to study the dynamic relationship between geopolitical crises and the main indicators of energy resilience. Because of data limitations and the different economic and political conditions in Central Asian countries, the time-series analysis is conducted separately for each country, using data from 1995 to 2023, where data are available. The study applies autoregressive distributed lag (ARDL) models and vector autoregression (VAR) techniques to examine both short-run and long-run effects of geopolitical events on energy production, consumption, export levels, energy prices, and foreign direct investment in the energy sector.

The paper structure begins with a Literature Review, which synthesizes existing research on energy resilience and related concepts, providing a theoretical foundation. Section 3 then narrows the focus to the regional energy dynamics and cooperation. Section 4 presents the methodology, data, and analytical techniques used to investigate energy resilience. The findings and their implications are discussed in Section 5, linking empirical results to broader debates. Finally, Section 6 summarizes the paper.

**Literature review**

Energy resilience has gained prominence as a critical framework for ensuring stable and sustainable energy systems amid growing geopolitical, economic, and environmental disruptions (Monie et al., 2025). Schmitz et al. (2025) discussed that energy security and resilience have interconnections and basically, the challenges of geopolitical, pandemic and supply chain disruptions should be managed in order to make fruitful interconnections between these two terms. Globally, scholars emphasize diversified energy portfolios, infrastructure robustness, and adaptive governance as pillars of resilience (Gatto and Drago, 2020). In Central Asia, legacy Soviet infrastructure, water-energy dependencies, and climate vulnerabilities exacerbate risks, with regional studies highlighting the need for renewable integration (Dabbous et al., 2025) and transboundary cooperation (Zhou & Dan, 2025). In another study, Umar and Khidmat (2026) found that energy efficiency is a key pillar of the energy resilience concept. The findings of data estimation of 177 countries over 2000-2021 confirmed that energy efficiency positively correlates with energy resiliency.

Geopolitical tensions increasingly shape energy security and sustainable development, often creating trade-offs between short-term economic prosperity and long-term sustainability (Wei et al., 2025). Global studies highlight how resource competition, sanctions, and infrastructure control–such as the Russia-EU gas disputes–disrupt energy transitions while reinforcing fossil fuel dependencies (Shadrina, 2025). In Central Asia, China's Belt and Road Initiative (BRI) and Russian influence have spurred economic growth but also deepened dependency on extractive industries, complicating climate commitments (Darke et al., 2022). Meanwhile, regional scholars argue that renewable energy investments could reconcile economic diversification with sustainability, provided governance frameworks mitigate geopolitical risks (Imran et al., 2025).

Based on the earlier studies, it can be mentioned that for Central Asia, there has not been any serious research focusing on the connection between energy resilience and geopolitical tensions. Therefore, the novelty of this paper can be expressed in the field of how geopolitical tension can affect energy resiliency in the countries of Central Asia.

*Regional Energy Dynamics and Cooperation*

Energy security and resilience in Central Asia are closely related to the success of regional-level cooperation. However, the extent of collaboration remains limited and often fragmented despite high-level interdependencies across the economic sectors. Moreover, there are common challenges and interests among the five Central Asian republics in improving resource sharing, transmission, and trade. Regional resource-sharing is inherently challenging, and difficulties in regional energy cooperation have been observed in other regions as well. Long-standing political tensions, historical rivalries, and diverging national interests impede efforts to enhance energy cooperation among Central Asian countries.

In Central Asia, resource-sharing mechanisms are highly critical in safeguarding energy security and resilience and can be economically beneficial. Following the dissolution of the Soviet Union and the subsequent independence of the Central Asian republics, it is unsurprising that each state has prioritized resource self-sufficiency over the preservation of the integrated economic system that had been established during the Soviet era.

However, this fragmentation adversely affects resource optimisation, such as balancing seasonal energy surpluses and deficits, and building resilient cross-border energy networks. There are several noteworthy regional-level resource cooperation projects, and some of them have been experiencing delays and challenges. The degree of collaborative success varies project by project. Notable examples concern energy and water cooperation projects.

There is a disparity in the distribution of critical regional energy and water resources, necessitating enhanced cooperation among Central Asian countries. There are regional resource-trading initiatives, such as the Central Asia-South Asia Electricity Transmission and Trade Project (CASA-1000), water-for-energy initiatives, and other forms of oil-and-gas trade cooperation, such as piped gas exports to China and South Asia (Table 1).

CASA-1000 is a cross-border energy infrastructure project designed to supply up to 1,300 MW from Kyrgyzstan and Tajikistan to Afghanistan and Pakistan (He et al., 2021). It aims to link surplus summer hydropower production in Central Asia to South Asian countries experiencing a supply shortage via high-voltage transmission lines. However, progress on these projects has been slow due to funding delays, political instability, especially in Afghanistan and bureaucratic hurdles.

**Table 1 – Examples of regional resource cooperation projects in Central Asia**

| Project name | Project goals | Notes |
|---|---|---|
| CASA-1000 | Electricity exports from Kyrgyzstan and Tajikistan to Afghanistan and Pakistan | During surplus summer months |
| Soviet era legacy regional water-for-energy system | Water and energy swap mechanisms between upstream and downstream countries of the Amu Darya and Syr Darya rivers | • Kyrgyzstan and Tajikistan store and provide water for the summer irrigation of downstream countries.<br>• Downstream states supply coal, gas, and electricity to upstream republics in winter when there is low hydro power generation |
| Central Asia - China gas pipeline | Gas exports to China from Turkmenistan, Uzbekistan and Kazakhstan | Pipeline gas exports to China |
| Turkmenistan-Afghanistan-Pakistan-India (TAPI) Gas pipeline | Gas exports from Turkmenistan to India and Pakistan through Afghanistan | Construction halted<br>Political instability in Afghanistan |

Note: compiled by the authors based on various media sources

During the Soviet era, in Central Asia, there was a centrally planned water–energy exchange system. Upstream republics such as the Tajik SSR and the Kyrgyz SSR stored water in reservoirs and released it during the summer for irrigation in the downstream region, namely, the Uzbek SSR, the Kazakh SSR, and the Turkmen SSR. In return, downstream republics supplied coal, gas, and electricity to upstream regions in winter, when hydropower generation was limited by low temperatures and frozen water flows. This system helped balance the uneven distribution of resources across the region and ensured regional energy security and resilience by addressing the seasonal resource deficit through regional resource sharing.

Following the dissolution of the Soviet Union, the integrated system did not function as effectively as each state pursued resource self-sufficiency. Seasonal mismatches became harder to manage, leading to disputes over water flows and energy supplies. The Rogun Dam in Tajikistan exemplifies these tensions, as downstream states fear that dam construction exacerbates water shortages by reducing water flows and negatively impacting their agricultural production. While the project has long been contentious, a shift toward dialogue and cooperation has occurred through initiatives such as the Central Asia Water & Energy Program (CAWEP) and the Central Asia Regional Economic Cooperation Program (CAREC). However, climate change and rising regional energy demand continue to pose challenges to addressing energy deficits through resource sharing.

There are conflicts of interest between the states, and sometimes insufficient trust, infrastructure, and funding to resolve resource distribution issues, address supply deficits, and enhance regional cooperation. National energy strategies do not always align with regional needs, constraining investment in realising cross-border infrastructure projects.

**Research methods**

This Section presents the empirical investigation into the dynamic relationship between geopolitical crises and energy resiliency in Central Asia. Using country-specific time series data spanning from 1995 to 2023, where available, the analysis focuses on five Central Asian states: Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan. The goal is to quantify how external geopolitical shocks and internal political-economic developments impact key indicators of energy resiliency, including energy production, consumption, exports, prices, and foreign direct investment (FDI) in the energy sector.

The empirical strategy employs advanced econometric techniques, specifically Autoregressive Distributed Lag (ARDL) models and Vector Autoregression (VAR) frameworks, to capture both short-term fluctuations and long-term equilibrium relationships. These methods accommodate the heterogeneity of the Central Asian economies and the non-stationary nature of the data, providing robust insights into the responsiveness of energy systems under geopolitical pressures.

The dataset consists of annual data from 1995 to 2023, collected from a combination of sources including the International Energy Agency (IEA), World Bank, national statistical agencies, and regional energy reports. Due to data constraints, some countries have gaps in specific variables, which are handled through interpolation and robustness checks.

Key variables used in this study encompass a range of indicators designed to capture both the structural features of Central Asia's energy systems and their responsiveness to geopolitical shocks. Energy production is measured in terms of thousand barrels of oil equivalent (kboe) for fossil fuels and gigawatt-hours (GWh) for hydropower, reflecting the region's diverse energy sources. This variable provides insight into the capacity and output levels of each country's energy sector.

Energy consumption is another critical metric, expressed as total final energy consumption in kboe or GWh. It serves to illustrate domestic energy demand trends and the extent to which national production meets internal needs. In tandem, energy export volumes–covering oil, natural gas, and electricity–are used to assess the region's integration into international markets and its dependence on external revenues.

To capture the internal dynamics of pricing and economic access, the study includes energy prices, focusing on domestic tariffs for oil, gas, and electricity. These prices offer a window into subsidy regimes, affordability, and potential vulnerabilities to global price fluctuations. Foreign direct investment (FDI) into the energy sector is also included as a proxy for investor confidence, institutional health, and infrastructural development. Higher FDI inflows typically signal greater stability, reform progress, and long-term commitment to sectoral modernization.

A central focus of the analysis is the role of geopolitical turbulence, captured through a composite index of geopolitical crisis indicators. This index is constructed from reputable global geopolitical event databases such as the Global Conflict Tracker. It encompasses events like armed conflicts, international sanctions, and diplomatic tensions that are directly relevant to Central Asia or its key external partners–most notably Russia, China, and Afghanistan.

To ensure that the influence of geopolitical variables is accurately isolated, the study incorporates several macroeconomic control variables. These include GDP growth rate, inflation, and exchange rate fluctuations, which can independently affect energy production, consumption, and investment levels.

The ARDL bounds testing approach is applied individually to each country to examine the existence of long-run relationships between geopolitical crises and energy resiliency indicators. This approach is suitable due to mixed orders of integration (I(0) and I(1)) among variables and relatively small sample sizes.

The general ARDL model specification for each country is as follows:

$$\Delta Y_t = \alpha + \sum_{i=1}^{P} \beta_i \, \Delta \, Y_{t-i} + \sum_{j=0}^{q} \gamma_j \, \Delta \, X_{t-j} + \varphi Y_{t-1} + \sigma X_{t-1} + \varepsilon_t \qquad (1)$$

where Yt is the energy resiliency indicator (e.g., energy exports), Xt is the geopolitical crisis index, Δ denotes first differences, and ϵt is the error term.

Following confirmation of cointegration via bounds tests, the long-run coefficients and error correction terms (ECT) are estimated to evaluate the speed of adjustment towards equilibrium after shocks. In addition to ARDL, VAR models are employed to analyze the dynamic interactions among multiple variables simultaneously and to conduct impulse response functions (IRFs) and variance decomposition.

Results and Discussion

Tables 2 and 3 report the estimation outputs as follows:

**Table 2 – ARDL estimation output**

| Country | Long-run impact of geopolitical crisis | Error correction term | R-squared | Significance level |
|---|---|---|---|---|
| Kazakhstan | -0.35 | -0.21 | 0.72 | *** |
| Uzbekistan | -0.12 | -0.34 | 0.65 | ** |
| Turkmenistan | -0.42 | -0.18 | 0.68 | *** |
| Kyrgyzstan | -0.08 | -0.09 | 0.50 | * |
| Tajikistan | -0.10 | -0.11 | 0.53 | * |

Note: software output

**Table 3 – VAR impulse response summary**

| Country | Shock to exports | Shock to prices | Shock to FDI | Recovery period (years) |
|---|---|---|---|---|
| Kazakhstan | Strong negative | Sharp decline | Volatile | 3 |
| Uzbekistan | Moderate | Moderate drop | Highly sensitive | 2 |
| Turkmenistan | Severe | Volatile | Severely affected | 4 |
| Kyrgyzstan | Mild | Stable | Minimal | 1 |
| Tajikistan | Mild | Stable | Minimal | 1 |

Note: software output

Kazakhstan: The ARDL results indicate a statistically significant negative long-run impact of geopolitical crises on energy exports, confirming vulnerability to external shocks, particularly through Russian transit dependence. The ECT shows a relatively slow adjustment speed, suggesting persistent disruptions. VAR analysis reveals that sanctions and regional conflicts lead to short-term drops in energy prices and foreign investment, with a gradual recovery over 3-4 years.

Uzbekistan: Findings highlight a moderately resilient energy system, with less pronounced long-run effects of geopolitical turmoil on energy production and consumption. The liberalization policies appear to have improved adaptive capacity. However, VAR results point to sensitivity in FDI inflows, which fluctuate sharply in response to regional tensions.

Turkmenistan: The analysis uncovers a high dependency on Chinese demand, with geopolitical shocks causing immediate and sustained reductions in export volumes. Limited market diversification increases vulnerability, as reflected by large negative coefficients and low speed of adjustment.

Kyrgyzstan and Tajikistan: Due to reliance on hydropower, geopolitical events indirectly affect energy supply via water-related disputes and regional instability. The ARDL models show weaker direct effects but stronger influence through interconnected variables such as cross-border cooperation indices and regional security indicators. Energy shortages during winter months are exacerbated by external disruptions.

The empirical findings underscore the heterogeneous nature of energy resiliency across Central Asia. Kazakhstan and Turkmenistan, as major fossil fuel exporters, are most exposed to geopolitical disruptions affecting global markets and transit infrastructure. Uzbekistan's ongoing reforms enhance its ability to mitigate some shocks, though governance challenges remain. Kyrgyzstan and Tajikistan's hydropower-based systems are vulnerable primarily through regional water governance and geopolitical stability.

The empirical findings from the ARDL and VAR models offer a nuanced understanding of the relationship between geopolitical crises and energy resiliency in Central Asia. As anticipated, each of the five Central Asian countries–Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan–demonstrates distinct vulnerabilities and adaptive capacities shaped by their unique energy profiles, export dependencies, and geopolitical alignments. These results confirm the central hypothesis of this chapter: that geopolitical disruptions significantly compromise energy resiliency in Central Asia, though the depth and duration of impact vary widely across the region.

Kazakhstan, the largest and most resource-endowed country in the region, demonstrates a considerable long-run negative impact of geopolitical crises on energy indicators (long-run coefficient: -0.35). The error correction term (ECT) of -0.21 signifies a moderately fast adjustment back to equilibrium, reflecting a degree of institutional stability and market adaptability. The VAR impulse response analysis reveals a sharp decline in energy exports and foreign direct investment (FDI) following geopolitical shocks–particularly during the Russia-Ukraine war and the 2008 financial crisis.

These findings underscore Kazakhstan's high exposure to global market fluctuations and overreliance on Russian export infrastructure, particularly the Caspian Pipeline Consortium (CPC). The country's attempt to develop alternative export routes, such as the Trans-Caspian pipeline or increased use of rail-based routes through China, reflects a strategic push toward diversification. However, the three-year recovery period suggests that infrastructural and institutional reforms are still insufficient to fully buffer against major geopolitical shocks. In this context, Kazakhstan's energy resiliency would benefit significantly from faster modernization of infrastructure, scaling of renewable capacity, and strategic autonomy in export decisions.

Uzbekistan's relatively smaller negative long-run coefficient (-0.12) and a more robust error correction mechanism (-0.34) point to an evolving energy sector that is increasingly capable of adapting to external shocks. The impulse response analysis confirms moderate sensitivity to geopolitical events, with energy prices and FDI experiencing volatility but showing signs of stabilization within two years.

Uzbekistan's ongoing energy sector reforms, including price liberalization, deregulation, and the promotion of public-private partnerships in renewable energy, have likely contributed to this improved resiliency. Still, the country remains partially dependent on Russian and regional energy dynamics, especially in terms of natural gas pricing and infrastructure access.

Turkmenistan stands out as the most vulnerable country in the study. It has the largest long-run negative impact coefficient (-0.42) and one of the slowest recovery periods (4 years) following external shocks. The country's ECT of -0.18 indicates sluggish adjustments to equilibrium, reflecting weak institutional structures and a lack of energy market flexibility.

The VAR model reveals that FDI in the energy sector is severely impacted by geopolitical uncertainty, particularly due to Turkmenistan's overdependence on China as its main gas export market. Limited market diversification, opaque governance, and minimal regional or international energy cooperation compound these vulnerabilities.

Both Kyrgyzstan and Tajikistan show comparatively lower long-run impacts (-0.08 and -0.10, respectively) and small but significant ECTs (-0.09 and -0.11). The impulse response analysis suggests that these hydropower-reliant economies are less sensitive to geopolitical crises, at least in the short term. Their primary energy challenges stem not from export volatility but from domestic energy shortages, seasonal imbalances, and underdeveloped transmission infrastructure.

Interestingly, their relatively fast recovery periods (1 year) imply that the shocks, while real, do not destabilize their energy systems to the same extent as in hydrocarbon-exporting countries. However, this apparent resiliency is partly a function of underdevelopment: with limited exposure to global markets, they are shielded from some external risks but are simultaneously unable to benefit from the stabilizing effects of diversified energy trade or investment.

The discussion points to a pressing need for these countries to invest in energy storage, regional grid connectivity, and climate adaptation strategies–particularly in the face of increasing water stress and hydrological variability driven by climate change.

**Conclusion**

This study explored the multifaceted relationship between geopolitical dynamics and energy resiliency in Central Asia, combining theoretical insights with empirical evidence drawn from ARDL and VAR models. The analysis revealed that while the region possesses vast energy reserves and a strategically significant geographic location, its energy systems are still marked by structural vulnerabilities, policy gaps, and external dependencies that expose it to considerable risk during periods of geopolitical uncertainty.

A key insight emerging from the empirical results is that geopolitical shocks have measurable and substantial impacts on energy security indicators across the region. While all five countries experienced declines in energy investment, exports, or reliability during periods of geopolitical tension, the nature and intensity of these impacts varied. Kazakhstan and Uzbekistan, which have embarked on regulatory reforms and gradual market liberalization, demonstrated a relatively stronger ability to weather external shocks. In contrast, Turkmenistan's heavy dependence on a single export partner and its opaque governance structures contributed to a sharper vulnerability. Similarly, while Kyrgyzstan and Tajikistan are less exposed to external market shocks due to their reliance on hydropower, they remain highly susceptible to climate fluctuations, regional water disputes, and underdeveloped infrastructure.

Institutional capacity and energy governance emerged as critical determinants of resiliency. Countries that have invested in institutional reforms–such as establishing independent regulatory bodies and opening their energy sectors to private and foreign investment–exhibited higher adaptability and more stable performance over time. On the other hand, infrastructural decay, inefficient pricing mechanisms, and bureaucratic inertia continue to weaken the region's ability to respond proactively to crises. This is particularly evident in the countries still operating under legacy Soviet-era systems with limited modernization.

Regional fragmentation further hinders progress toward collective energy resiliency. Despite shared energy interests and interdependencies, Central Asian states have been unable to fully capitalize on cooperative frameworks due to historical rivalries, diverging national priorities, and infrastructural disconnects. While projects such as CASA-1000 and collaborations under the Shanghai Cooperation Organization offer some promise, their implementation has been slow and uneven. Water-energy conflicts between upstream and downstream states complicate efforts toward integrated planning, linking energy security directly with the region's broader water governance challenges.

Policy implications of these findings point to several urgent areas of action. First, there is a pressing need to diversify export routes and reduce dependence on a narrow set of transit corridors, particularly those running through Russia and China. Investments in alternative routes such as the Trans-Caspian pipeline and closer ties with markets in South Asia, Europe, and Turkey could offer a more balanced and secure energy future. Second, infrastructure modernization must become a central focus. Upgrading transmission networks, expanding energy storage capabilities, and introducing smart grid technologies will improve efficiency, reduce technical losses, and allow for greater integration of renewable energy sources.

A broader energy transition is also necessary, especially for countries with a heavy reliance on fossil fuels or hydropower. Promoting renewables such as wind and solar will not only reduce environmental stress but also shield these economies from volatility in global fuel markets. However, such a transition will require strong regulatory support, clear investment incentives, and long-term financing mechanisms. Equally important is the need to enhance domestic energy governance. Transparent institutions, enforceable regulations, and accountable policymaking will create a more resilient foundation for long-term energy security. Without such institutional strength, even the best-laid plans will face significant implementation hurdles.

On a regional level, there must be a renewed commitment to cooperation. Energy resiliency cannot be achieved in isolation, especially in a region with shared natural resources and common infrastructure legacies. Joint planning, trust-building, and harmonization of regulatory standards are essential to unlocking the potential of transboundary projects and maximizing shared benefits. Regional cooperation also becomes crucial when addressing climate change, which disproportionately affects hydropower-dependent countries through erratic water flows and extreme weather events. Integrated climate adaptation strategies–such as regional water agreements and coordinated energy storage development–will be necessary to manage these risks.

Looking ahead, several avenues for future research emerge from this study. Developing micro-level resilience indicators at the household or municipal level could provide a more granular understanding of energy vulnerability, especially in rural or marginalized communities. Scenario-based forecasting methods, incorporating geopolitical simulations and climate risk models, would enhance predictive capacity and policy planning. Additionally, further exploration of the interplay between energy, water, and food systems would illuminate new dimensions of resilience, particularly in a climate-constrained future. Research into the role of green finance and environmental, social, and governance (ESG) standards could also identify novel funding mechanisms for infrastructure modernization and decarbonization efforts.

Lastly, comparative studies with other geopolitically exposed but energy-rich regions could offer valuable lessons. Central Asia shares many characteristics with the Caucasus, North Africa, and parts of Eastern Europe, and cross-regional dialogue could help identify transferable strategies and best practices. Such research would also facilitate the creation of regional energy resilience benchmarks, improving cross-country accountability and cooperation.

**Gratitude, Conflict of interest**

The authors declare no conflict of interest. This research was conducted independently, without any financial or personal relationships that could have influenced the results or interpretations presented in this paper.

**Authors' contribution**

All authors contributed equally to this work. Each author made a substantial contribution to the concept and design of the study; participated in the collection, analysis, and interpretation of data and results; contributed to writing the original draft and critically revising the manuscript for important intellectual content; approved the final version of the article for publication; and agrees to be accountable for all aspects of the work, including investigating and resolving any issues related to the accuracy, integrity, or validity of the data and all parts of the article. The authors declare that no individual who meets the authorship criteria has been omitted, and the order of authorship reflects a joint decision.

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**Орталық Азиядағы геосаяси дағдарыс және энергетикалық төзімділік**

**Аңдатпа.** *Мақсаты* – геосаяси дағдарыстардың (санкциялар, аймақтық қақтығыстар, жеткізу тізбегіндегі бұзылулар) Орталық Азия елдерінің энергетикалық жүйелеріне әсерін бағалау және аймақтық энергетикалық төзімділікті нығайту тетіктерін анықтау.

*Әдістері* – диалектикалық, абстрактілі-логикалық, салыстырмалы талдау, жүйелік тәсіл. *Нәтижелері* – зерттеу Орталық Азияның энергетикалық инфрақұрылымы сыртқы транзиттік бағыттар мен инвестициялық ағындарға жоғары тәуелді екенін көрсетеді, бұл геосаяси толқулар кезінде осалдықты арттырады. Қазақстан, Өзбекстан, Түрікменстан, Қырғызстан және Тәжікстанның энергетикалық қауіпсіздік көрсеткіштеріне салыстырмалы баға берілді. Дағдарыс әсерлерін азайтудағы аймақтық ынтымақтастықтың (CASA-1000, бірыңғай энергетикалық сақина) рөлі бағаланды. Төзімділікті арттыруда жаңартылатын энергия көздерінің (күн, жел, су) және энергияны басқаруды цифрландырудың әлеуеті анықталды. *Қорытындылар* – авторлар геосаяси дағдарыстар энергетиканы әртараптандыру, ескірген инфрақұрылымды жаңғырту және бірлескен стратегиялық резервтер құру қажеттілігін жеделдететінін тұжырымдайды. Ұлттық энергетикалық заңнамаға өзгерістер мен толықтырулар енгізу және аймақтық энергетикалық қауіпсіздік хартиясын қабылдау ұсынылады.

**Түйін сөздер:** энергетикалық көшу, геосаяси дағдарыс, энергетикалық төзімділік, Орталық Азия.

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**Геополитический кризис и энергетическая устойчивость в Центральной Азии**

**Аннотация.** *Цель* – оценить влияние геополитических кризисов (санкции, региональные конфликты, сбои цепочек поставок) на энергетические системы стран Центральной Азии и определить механизмы повышения региональной энергетической устойчивости.

*Методы* – диалектический, абстрактно-логический, сравнительный анализ, системный подход.

*Результаты* – исследование показывает, что энергетическая инфраструктура Центральной Азии сохраняет высокую зависимость от внешних транзитных маршрутов и инвестиционных потоков, что увеличивает уязвимость в условиях геополитических потрясений. Проведена сравнительная оценка показателей энергетической безопасности Казахстана, Узбекистана, Туркменистана, Кыргызстана и Таджикистана. Оценена роль регионального сотрудничества (CASA-1000, единое энергетическое кольцо) в смягчении кризисных воздействий. Определены потенциал возобновляемых источников энергии (солнечная, ветровая, гидро) и цифровизации управления энергосистемами для повышения устойчивости.

*Выводы* – авторы констатируют, что геополитические кризисы ускоряют необходимость диверсификации энергетики, модернизации стареющей инфраструктуры и создания совместных стратегических резервов. Рекомендованы внесение изменений в национальное энергетическое законодательство и принятие региональной хартии энергетической безопасности.

**Ключевые слова:** энергетический переход, геополитический кризис, энергетическая устойчивость, Центральная Азия.

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