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"FROM HYDROCARBONS TO RENEWABLES: THE EU-AZERBAIJAN ENERGY PARTNERSHIP IN A CHANGING GEOPOLITICAL LANDSCAPE"

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Introduction

The European Union's (EU) pursuit of energy security has been a defining element of its policy framework, driven by the need to reduce dependency on a narrow set of external suppliers and to transition toward a sustainable energy future. This pursuit has gained renewed urgency in the wake of the Russia-Ukraine war, which has underscored the geopolitical risks of energy reliance and disrupted traditional supply chains. With nearly 40% of its gas imports historically sourced from Russia, the EU faces critical challenges in reshaping its energy landscape. In this context, Azerbaijan has emerged as a strategic ally, uniquely positioned to support both the EU's immediate energy needs and its long-term climate objectives.

Azerbaijan's geographical location at the crossroads of Europe and Asia, coupled with its substantial energy resources, underpins its strategic importance to the EU. Historically, Azerbaijan's contribution to European energy security has centered on hydrocarbon exports, facilitated through infrastructure projects like the Southern Gas Corridor (SGC). This corridor, a vital component of the EU's diversification strategy, exemplifies the potential of energy partnerships in mitigating dependency on Russian supplies. Beyond hydrocarbons, Azerbaijan has increasingly signaled its commitment to renewable energy development, positioning itself as a contributor to the EU's broader decarbonization agenda under initiatives such as the REPowerEU Plan and the European Green Deal.

Theoretical perspectives such as energy security theory and resource diplomacy frameworks illuminate the strategic significance of this partnership. Energy security theory highlights the importance of diversified supply chains to mitigate risks, while resource diplomacy underscores the geopolitical leverage of resource-rich nations like Azerbaijan. These perspectives offer a lens to analyze the EU-Azerbaijan relationship as a model for integrating energy security with sustainable development goals.

This article critically examines the evolution of EU-Azerbaijan energy relations, tracing their historical foundations, assessing current dynamics, and exploring future prospects. By analyzing key projects, policy frameworks, and the broader geopolitical context, it provides insights into how this partnership can address immediate energy demands while supporting long-term sustainability. Ultimately, the study aims to contribute to the scholarly discourse on energy policy and regional cooperation, emphasizing the potential of the EU-Azerbaijan relationship as a model for balancing energy security and climate objectives in a rapidly changing global landscape.

The Historical Evolution of EU-Azerbaijan Energy Relations

The energy partnership between the European Union (EU) and Azerbaijan is rooted in the geopolitical and economic transformations that followed the dissolution of the Soviet Union. In the early 1990s, Azerbaijan emerged as a key player in the global energy landscape, endowed with vast hydrocarbon resources and positioned strategically at the crossroads of Europe and Asia. Azerbaijan's journey as an energy partner for the EU began with its openness to foreign investment and collaboration in the post-Soviet era. The signing of the "Contract of the Century" in 1994 marked a pivotal moment, attracting 11 international energy companies from seven countries to develop the country's vast oil reserves in the Azeri-Chirag-Gunashli (ACG) fields. This agreement symbolized Azerbaijan's reintegration into the global energy market and laid the foundation for its role as a reliable energy supplier to Europe.

Building on this momentum, the 1996 Partnership and Cooperation Agreement (PCA) between the EU and Azerbaijan institutionalized their relationship. This agreement provided a framework for political dialogue, trade, and energy cooperation, reflecting the EU's strategic interest in the Caspian region's energy resources. Subsequent inclusion of Azerbaijan in the European Neighborhood Policy

(ENP) in 2005 and the Eastern Partnership (EaP) in 2009 further deepened their ties, fostering shared goals such as market liberalization and energy security. The 2006 Memorandum of Understanding on a Strategic Partnership in the Field of Energy marked another milestone. This agreement outlined key areas of collaboration, including the harmonization of Azerbaijan's energy legislation with EU standards, security of energy supply routes, and technical cooperation [1]. These early frameworks established Azerbaijan as a dependable partner in the EU's quest to diversify its energy imports.

The evolution of EU-Azerbaijan energy relations is closely tied to transformative infrastructure projects that have reshaped regional energy geopolitics. Among these, the Baku-Tbilisi-Ceyhan (BTC) pipeline stands out as a landmark achievement. Operational since 2006, the BTC pipeline transports crude oil from the Caspian Sea to the Mediterranean port of Ceyhan, bypassing Russian territory. Its operational capacity of one million barrels per day underscores Azerbaijan's strategic importance in providing Europe with alternative energy routes. The Southern Gas Corridor (SGC), launched in 2018, further solidified Azerbaijan's role as a cornerstone of EU energy security. This ambitious project comprises three interconnected pipelines: the South Caucasus Pipeline (SCP), the Trans-Anatolian Pipeline (TANAP), and the Trans-Adriatic Pipeline (TAP). Together, these pipelines transport natural gas from Azerbaijan's Shah Deniz field to European markets. The geopolitical landscape has significantly influenced EU-Azerbaijan energy relations. The Russia-Ukraine gas crises of 2006 and 2009 exposed Europe's vulnerabilities, prompting accelerated efforts to diversify energy sources and supply routes. In this context, Azerbaijan emerged as a vital partner, offering secure and reliable alternatives through its pipelines.

Current Energy Cooperation Between the EU and Azerbaijan

The partnership between the European Union (EU) and Azerbaijan has evolved into a multidimensional collaboration, reflecting shared goals of energy security, economic diversification, and environmental sustainability. The strategic importance of this relationship has grown significantly in recent years, particularly in light of geopolitical disruptions such as the Russia-Ukraine war. The Southern Gas Corridor (SGC) remains a cornerstone of EU-Azerbaijan energy cooperation, playing a pivotal role in reducing Europe's dependency on Russian energy supplies. Operational since 2020, the SGC currently delivers 10-12 billion cubic meters (bcm) of natural gas annually to Europe, with plans to expand capacity to 20 bcm by 2027.

Table 1: Azerbaijan Gas Exports to EU (2021-2023)

Year	Gas Exported to EU (bcm)	Export Revenue (USD Billion)	Major Importers
2021	8.0	5.56	Italy, Greece, Bulgaria
2022	11.4	14.99	Italy, Greece, Bulgaria, Romania
2023	11.8	13.68	Italy, Greece, Bulgaria, Romania, Hungary

Source: *Azerbaijan State Customs Committee.*

These expansions are underpinned by investments in new infrastructure and gas fields, such as the Absheron gas field, which is expected to contribute significantly to Azerbaijan's export volumes by the mid-2020s. Beyond its immediate function as a gas supply route, the SGC is increasingly viewed as a platform for regional energy integration. Azerbaijan's infrastructure facilitates potential transit of gas from neighboring states, such as Turkmenistan, to European markets [2]. While hydrocarbons dominate Azerbaijan's current energy exports, the EU-Azerbaijan partnership is gradually shifting toward renewable energy. Azerbaijan's commitment to achieving 30% renewables in its energy mix by 2030 aligns closely with the EU's Green Deal objectives. Recent initiatives, such as the 2022 Memorandum of Understanding on Energy Partnership, underscore the shared priority of advancing renewable energy integration [3].

The Black Sea Undersea Cable Project exemplifies the potential for transformative collaboration in renewables. This project aims to deliver up to 4 GW of renewable energy from Azerbaijan to European markets via Georgia and Romania, leveraging Azerbaijan's abundant wind and solar resources [4]. Offshore wind development, with an estimated capacity

of 7 GW, is emerging as a focus area, supported by international investments and partnerships. Additionally, solar energy projects in regions such as the Absheron Peninsula and the liberated territories of Karabakh contribute to Azerbaijan's energy diversification and post-conflict reconstruction efforts.

The transition toward a diversified energy mix presents both opportunities and challenges for Azerbaijan. Modernizing its energy infrastructure to accommodate renewable energy sources remains a priority. Historically designed for hydrocarbons, Azerbaijan's grid requires substantial upgrades to integrate intermittent renewable sources like wind and solar. Initiatives to implement smart grid technologies and enhance energy storage capacity are essential to achieving this goal. Regulatory reforms are equally critical. While Azerbaijan's Renewable Energy Law (2021) has laid a foundation for private sector participation, further measures are needed to attract foreign investment. Transparent power purchase agreements (PPAs) and investor-friendly tariff structures will be crucial to scaling up renewable energy projects.

Renewable Energy Transition: Azerbaijan's Strategic Role"

As the global energy landscape transitions toward sustainability, Azerbaijan has taken significant strides to position itself as a leader in renewable energy within the Caspian region. While hydrocarbons continue to dominate its energy exports, the country's growing commitment to renewable energy aligns with the European Union's (EU) broader decarbonization objectives. Azerbaijan's renewable energy resources are vast, with an estimated 157 GW of wind and solar capacity. The Caspian Sea's offshore wind energy potential, estimated at 7 GW, highlights its ability to generate clean energy on a large scale. Similarly, high solar irradiance in regions such as the Absheron Peninsula and Karabakh offers promising opportunities for solar farm development. By leveraging these resources, Azerbaijan can reduce its reliance on hydrocarbons and contribute to Europe's renewable energy goals.

The Black Sea Undersea Cable Project represents one of the most transformative initiatives in Azerbaijan's renewable energy strategy. Spanning approximately 1,195 kilometers, this high-voltage submarine cable aims to connect Azerbaijan's renewable energy resources to Europe through Georgia, Romania, and Hungary, delivering up to 4 GW of electricity generated from Azerbaijan's wind and solar resources. Supported by €2.3 billion in EU investments, the project underscores Azerbaijan's commitment to integrating its energy infrastructure with European markets.

Table 2: Current Solar Projects in Azerbaijan:

Solar Project	Location	Capacity	Investment
Garadagh Solar Plant	Near Baku	230 MW	€300 million
Solar Farms in Karabakh	Liberated Territories	270 MW	€500 million
Nakhchivan Solar Initiative	Nakhchivan Autonomous Republic	100 MW	€150 million

Source: *Ministry of Energy of the Republic of Azerbaijan.*

Azerbaijan is investing heavily in renewable energy projects in the liberated regions of Karabakh and Eastern Zangezur. A total of 32 power plants with a combined capacity of 270 MW are under construction. These facilities aim to fully supply the energy needs of the region, with surplus energy intended for export. Wind and solar energy potentials in areas like Lachin, Kalbajar, and Jabrayil highlight Azerbaijan's post-conflict reconstruction efforts [5].

The EU's Green Deal and REPowerEU Plan provide a framework for enhancing cooperation in renewable energy. Joint initiatives in wind, solar, and green hydrogen production offer avenues for diversifying Azerbaijan's energy exports while supporting Europe's decarbonization goals. Collaborative research and knowledge-sharing programs between the EU and Azerbaijan can accelerate innovation, addressing both technical and policy challenges.

Geopolitical and Economic Dynamics in the Energy Partnership

The EU-Azerbaijan energy partnership is not only a technical collaboration but also deeply influenced by geopolitical and economic dynamics. These factors shape the scope, implementation, and sustainability of energy projects while impacting both parties' strategic interests. The geopolitical landscape of the South Caucasus plays a critical role

in defining the EU-Azerbaijan energy relationship. The Russia-Ukraine war has underscored Europe's vulnerabilities in energy dependency, prompting accelerated diversification efforts. Azerbaijan's location at the crossroads of Europe and Asia positions it as a vital partner in reducing Europe's reliance on Russian energy supplies. However, regional instability tensions between neighbouring countries pose risks to energy infrastructure and supply routes [6].

Additionally, Azerbaijan's growing collaboration with Central Asian states such as Kazakhstan and Uzbekistan through initiatives like the Caspian Green Energy Corridor signifies a new chapter in regional geopolitics. This project not only enhances Azerbaijan's role as a transit hub but also strengthens its geopolitical leverage as an energy bridge between Europe and Asia.

Azerbaijan's economy remains heavily reliant on hydrocarbon exports, which account for over 90% of its export revenues. This dependency creates both opportunities and challenges in its energy partnership with the EU. On one hand, Azerbaijan's robust energy infrastructure, including the Southern Gas Corridor (SGC), positions it as a reliable supplier of natural gas. On the other, global decarbonization trends, driven by initiatives like the EU's Green Deal, necessitate a strategic pivot toward renewable energy to sustain its economic relevance [7]. The economic relationship between the EU and Azerbaijan is characterized by mutual dependencies. The EU is Azerbaijan's largest trading partner, accounting for over 50% of its exports. Expanding renewable energy exports, such as wind and solar power, offers a pathway to reduce reliance on hydrocarbons.

Energy infrastructure security is a pressing concern in the EU-Azerbaijan partnership. Pipelines like the SCP, TANAP, and TAP, which form the backbone of the SGC, are vulnerable to geopolitical risks, including sabotage and cyberattacks. The sabotage of the Nord Stream pipelines has heightened awareness of such risks, emphasizing the need for robust security measures [8]. In addition to physical security, the EU and Azerbaijan must address challenges related to the integration of renewable energy infrastructure. Upgrading grid systems to accommodate intermittent renewable sources and ensuring the resilience of undersea cables like the Black Sea Undersea Cable are critical to maintaining energy stability. Regional cooperation is pivotal in overcoming geopolitical and economic challenges. Azerbaijan's partnerships with neighboring countries, such as Georgia, Turkey, and Turkmenistan, enhance the connectivity and reliability of energy supply routes.

Azerbaijan's commitment to economic diversification is central to its long-term energy strategy. Investments in renewable energy projects, such as the Khizi-Absheron Wind Plant and solar farms in liberated territories, reflect a shift toward sustainability. Collaborative efforts with the EU in research and development (R&D) can foster innovation and create high-value jobs in emerging energy sectors .

Policy Recommendations for a Sustainable Partnership

The evolving energy partnership between the European Union (EU) and Azerbaijan presents immense opportunities for mutual benefit. However, addressing the complexities of geopolitical tensions, infrastructural challenges, and global decarbonization goals requires targeted policy interventions. Given the vulnerabilities of critical energy infrastructure, both the EU and Azerbaijan must prioritize investments in security and resilience. A joint task force should be established to monitor and protect key infrastructure such as the Southern Gas Corridor (SGC), Black Sea Undersea Cable, and renewable energy grids. Advanced technologies, including real-time monitoring systems, cybersecurity protocols, and autonomous inspection tools, need to be adopted to safeguard pipelines and undersea cables [9]. Regular risk assessments and crisis simulations are also essential to prepare for potential disruptions caused by geopolitical conflicts or natural disasters.

Regulatory alignment is essential for fostering investor confidence and integrating Azerbaijan more deeply into the European energy market. Permitting processes should be streamlined, and transparency in power purchase agreements (PPAs) needs to be enhanced to attract foreign investment. Consistent tariff structures and long-term contracts can reduce market uncertainty. A harmonized regulatory framework for cross-border renewable energy trade should also be developed through platforms like the Eastern Partnership.

To align with the EU's Green Deal objectives, Azerbaijan must fast-track its renewable energy

projects. Public-private partnerships should be expanded to scale up projects such as the Khizi-Absheron Wind Plant and solar farms in Karabakh. EU expertise and financing mechanisms, including the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD), should be leveraged to implement large-scale initiatives like green hydrogen production. A national renewable energy roadmap with clear milestones for achieving the 30% renewables target by 2030 must also be established.

Azerbaijan's role as a regional energy hub can be enhanced through strengthened collaboration with neighboring countries. The Caspian Green Energy Corridor should be expanded to integrate renewable resources from Kazakhstan, Uzbekistan, and Turkmenistan into the European grid. Trilateral agreements with Georgia and Turkey can be facilitated to secure transit routes for green energy exports. Regional energy forums should be organized to address shared challenges, including infrastructure financing and regulatory harmonization [10].

Economic resilience requires reducing dependence on hydrocarbons and fostering innovation in emerging energy sectors. Research and development (R&D) centers focused on renewable technologies and smart grid solutions should be established in partnership with EU institutions. Local manufacturing of renewable energy components, such as wind turbines and solar panels, should be promoted to create jobs and reduce import dependency. Incentives for small and medium-sized enterprises (SMEs) to participate in renewable energy supply chains can also support diversification effort. Both Azerbaijan and the EU must address the climate risks associated with energy production and distribution. Joint projects to enhance energy efficiency and reduce greenhouse gas emissions in Azerbaijan's industrial and residential sectors should be implemented. Best practices on water management and land-use planning must be shared to mitigate the environmental impacts of large-scale renewable energy projects. Additionally, climate-resilient energy infrastructure capable of withstanding extreme weather events needs to be developed.

Azerbaijan can benefit from EU expertise to accelerate its energy transition. Training programs for Azerbaijani engineers and policymakers on renewable energy technologies and regulatory practices should be created. Exchange programs between EU and Azerbaijani universities can foster innovation and build a skilled workforce. Technical assistance for implementing smart grids and integrating intermittent renewable energy sources should also be facilitated.

Conclusion

The EU-Azerbaijan energy partnership exemplifies a dynamic response to the dual challenges of energy security and sustainable development in a rapidly evolving geopolitical landscape. This relationship has evolved from a transactional dependency on hydrocarbons to a multifaceted collaboration that integrates renewable energy initiatives, infrastructure modernization, and regional connectivity. Through transformative projects like the Southern Gas Corridor and the Black Sea Undersea Cable, Azerbaijan has emerged as a pivotal player in Europe's energy diversification and decarbonization efforts.

However, the partnership is not without its complexities. The intersection of regional instability, infrastructural vulnerabilities, and the pressing need for regulatory alignment underscores the critical role of sustained dialogue and strategic investment. Addressing these challenges requires a forward-looking policy framework that balances short-term energy security with long-term sustainability objectives.

Azerbaijan's ongoing energy transition, marked by its ambitious renewable energy targets, highlights its potential as a model for other resource-rich nations navigating the global shift toward sustainability. Similarly, the EU's support in fostering innovation, financing large-scale projects, and providing technical expertise underscores the value of international cooperation in tackling shared energy challenges.

The lessons from this partnership extend beyond its immediate context, offering broader insights into how regional energy collaborations can address global imperatives such as climate change and geopolitical stability. By fostering innovation, enhancing infrastructure resilience, and aligning policies with decarbonization goals, the EU-Azerbaijan relationship has the potential to serve as a blueprint for integrating energy security and sustainability in the 21st century.

Ultimately, the success of this partnership hinges on its ability to adapt to emerging challenges while capitalizing on new opportunities, ensuring mutu-

al benefits and broader contributions to the global energy transition. This synthesis of energy security and sustainability provides a compelling model for balancing economic growth, environmental stewardship, and geopolitical stability in an increasingly interconnected world.

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SUMMARY

The European Union (EU) and Azerbaijan have cultivated a dynamic energy partnership that reflects the evolving demands of global energy security, sustainability, and geopolitical realities. This article explores how Azerbaijan has transitioned from being a key hydrocarbon supplier through initiatives like the Southern Gas Corridor (SGC) to becoming a vital player in Europe's renewable energy landscape. Transformative projects such as the Black Sea Undersea Cable and the Caspian Green Energy Corridor highlight Azerbaijan's emerging role as a leader in renewable energy integration, aligning with EU objectives under the Green Deal and REPowerEU Plan.

Key challenges, including infrastructure vulnerabilities, regulatory alignment, and geopolitical risks, are critically examined alongside opportunities for economic diversification and innovation. Azerbaijan's investments in renewable technologies, green hydrogen production, and regional energy cooperation underscore its commitment to fostering a sustainable energy future. The study concludes that the EU-Azerbaijan partnership serves as a model for balancing immediate energy security needs with long-term decarbonization goals, offering a pathway for resilience and innovation in a rapidly changing energy landscape.

Keywords: *EU-Azerbaijan Energy Partnership, Renewable Energy Integration, Southern Gas Corridor (SGC), Caspian Green Energy Corridor, Black Sea Undersea Cable*

ОТ УГЛЕВОДОРОДОВ К ВОЗОБНОВЛЯЕМЫМ ИСТОЧНИКАМ ЭНЕРГИИ: ЭНЕРГЕТИЧЕСКОЕ ПАРТНЕРСТВО ЕС И АЗЕРБАЙДЖАНА В МЕНЯЮЩЕМСЯ ГЕОПОЛИТИЧЕСКОМ ЛАНДШАФТЕ

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РЕЗЮМЕ

Европейский союз (ЕС) и Азербайджан развивают динамичное энергетическое партнерство, которое отражает меняющиеся требования глобальной энергетической безопасности, устойчивости и геополитических реалий. В этой статье рассматривается, как Азербайджан перешел от статуса ключевого поставщика углеводородов посредством таких инициатив, как Южный газовый коридор (ЮГК), к статусу важного игрока в ландшафте возобновляемой энергетики Европы. Такие преобразующие проекты, как Черномор-

ский подводный кабель и Каспийский зеленый энергетический коридор, подчеркивают растущую роль Азербайджана как лидера в интеграции возобновляемой энергетики, что соответствует целям ЕС в рамках Зеленого соглашения и Плана REPowerEU.

Ключевые проблемы, включая уязвимость инфраструктуры, нормативное соответствие и геополитические риски, критически рассматриваются наряду с возможностями для экономической диверсификации и инноваций. Инвестиции Азербайджана в возобновляемые технологии, производство зеленого водорода и региональное энергетическое сотрудничество подчеркивают его приверженность содействию устойчивому энергетическому будущему. В исследовании делается вывод о том, что партнерство ЕС-Азербайджан служит моделью для балансирования непосредственных потребностей в энергетической безопасности с долгосрочными целями декарбонизации, предлагая путь к устойчивости и инновациям в быстро меняющемся энергетическом ландшафте.

Ключевые слова: *Энергетическое партнерство ЕС-Азербайджан, Интеграция возобновляемых источников энергии, Южный газовый коридор (ЮГК), Каспийский зеленый энергетический коридор, Черноморский подводный кабель*

HİDROKARBONLARDAN BƏRPA OLAN ENERJİYƏ: DƏYİŞƏN GEOPOLİTİK VƏZİYYƏTDƏ Aİ-AZƏRBAYCAN ENERJİ TƏRƏFDAŞLIĞI

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XÜLASƏ

Avropa İttifaqı (Aİ) və Azərbaycan qlobal enerji təhlükəsizliyi, dayanıqlılıq və geosiyasi reallıqların inkişaf edən tələblərini əks etdirən dinamik enerji tərəfdaşlığı inkişaf etdiriblər. Bu məqalə Azərbaycanın Cənub Qaz Dəhlizi (SGC) kimi təşəbbüslər vasitəsilə əsas karbohidrogen təchizatçısından Avropanın bərpaolunan enerji mənzərəsində mühüm oyunçuya çevrilməsinə necə keçdiyini araşdırır. Qara Dəniz Sualtı Kabel və Xəzər Yaşıl Enerji Dəhlizi kimi transformativ layihələr Azərbaycanın Yaşıl Sövdələşmə və REPowerEU Planı çərçivəsində Aİ məqsədlərinə uyğunlaşaraq bərpa olunan enerji inteqrasiyasında lider kimi yüksələn rolunu vurğulayır.

İnfrastruktur zəifliklər, tənzimləmə uyğunluğu və geosiyasi risklər daxil olmaqla əsas problemlər iqtisadi diversifikasiya və innovasiya imkanları ilə yanaşı tənqidi şəkildə araşdırılır. Azərbaycanın bərpa olunan texnologiyalara, yaşıl hidrogen istehsalına və regional enerji əməkdaşlığına sərmayələri onun davamlı enerji gələcəyini dəstəkləmək öhdəliyini vurğulayır. Tədqiqat belə nəticəyə gəlir ki, Aİ-Azərbaycan tərəfdaşlığı qısamüddətli enerji təhlükəsizliyi ehtiyaclarını uzunmüddətli dekarbonizasiya məqsədləri ilə balanslaşdırmaq üçün model rolunu oynayır, sürətlə dəyişən enerji landşaftında davamlılıq və innovasiya üçün həll yolları təklif edir.

Açar sözlər: *Aİ-Azərbaycan Enerji Tərəfdaşlığı, Bərpa Olunan Enerji İnteqrasiyası, Cənub Qaz Dəhlizi (SGC), Xəzər Yaşıl Enerji Dəhlizi, Qara Dəniz Sualtı Kabeli.*