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EVALUATION OF GLOBAL AND DOMESTIC DEMAND CONDITIONS FOR ENERGY FROM AZERBAIJAN

Abstract

One of the key factors determining Azerbaijan's energy export potential is the evaluation of both global and domestic demand conditions. On a global scale, the demand for energy resources is shaped by factors such as economic growth, the level of industrialization, environmental regulations, and technological advancements. In particular, rising industrial and transportation needs in developing countries are driving energy consumption upwards. In this context, Azerbaijan contributes to global energy security by supplying its energy resources—especially oil, natural gas, and alternative energy sources—to international markets. Domestically, energy demand is influenced by population growth, the development of industry and agriculture, and the implementation of new technologies. Government initiatives focused on energy efficiency and the promotion of renewable energy also play an important role in shaping the internal energy landscape. In addition, one of the priorities of domestic energy policy is the diversification of the economy and the optimization of energy consumption. The modernization of industry and the application of new technologies in Azerbaijan are influencing the structure of energy consumption, creating the basis for more stable and sustainable energy supply mechanisms. At the same time, the growing energy demand in agriculture and regional development necessitates the implementation of balanced and flexible energy strategies in the domestic market. Fluctuations in global energy prices and shifting geopolitical dynamics also have a direct impact on Azerbaijan's energy sector. In order to remain competitive and ensure long-term stability, Azerbaijan must continuously assess international market trends and adjust its export strategies accordingly. Furthermore, investments in renewable energy sources such as solar and wind power are becoming increasingly important, not only to meet environmental commitments but also to reduce dependence on fossil fuels and enhance energy security. Overall, a comprehensive understanding of both global and domestic energy demand conditions is essential for formulating strategic policies that will sustain Azerbaijan's position as a key energy supplier in the region and beyond.

Keys word: global energy demand, fossil fuels, energy security, energy strategy, energy supply stability.

INTRODUCTION

Energy resources play a crucial role in the economic development and strategic interests of countries around the world. Changes in the global energy market, rising demand, and increasing environmental concerns directly influence national energy policies. In this context, Azerbaijan, with its rich energy reserves, stands out as a key player in both regional and global energy markets. For the successful implementation of the country's energy strategy, it is essential to thoroughly assess the existing energy demand both globally and domestically. A comprehensive approach is required

to expand export opportunities while meeting the needs of the internal market (Mammadov, Z., & Jafarova, G., 2020: p. 481). This introduction aims to analyze the global and domestic demand factors that shape Azerbaijan's energy potential and influence its economic resilience. In recent years, the global shift towards cleaner and more sustainable energy sources has added a new dimension to the assessment of energy demand. Countries are increasingly focused on reducing carbon emissions and transitioning to renewable energy, which in turn affects the demand for traditional fossil fuels such as oil and natural gas. Despite this shift, hydrocarbons continue to play a dominant role in meeting the world's energy needs, particularly in developing economies with growing industrial and infrastructural requirements. For Azerbaijan, this evolving energy landscape presents both opportunities and challenges. On one hand, the country can leverage its strategic location and well-developed export infrastructure - such as pipelines and port facilities—to maintain and expand its presence in international energy markets. On the other hand, Azerbaijan must also adapt to changing market dynamics by investing in alternative energy sources and improving energy efficiency at home. Understanding domestic energy demand is equally important. Population growth, urbanization, industrial expansion, and efforts to modernize the agricultural sector all contribute to rising energy consumption within the country. Moreover, government initiatives aimed at boosting the use of renewable energy and improving the efficiency of existing systems are critical to ensuring long-term energy sustainability. By carefully evaluating both global trends and internal needs, Azerbaijan can build a balanced and forward-looking energy strategy that strengthens its role in the global energy market while securing its national energy future (Guliyev, T., & Mammadov, D., 2022: p. 283).

Assessing Azerbaijan's Energy Prospects: Global Trends and Domestic Demand

Energy has long been a cornerstone of economic growth and national development, shaping global relations and domestic priorities alike. As countries around the world face the dual challenge of meeting rising energy demand while transitioning to more sustainable sources, energy-exporting nations like Azerbaijan find themselves at a critical juncture. With abundant oil and natural gas reserves, as well as growing interest in renewable energy, Azerbaijan holds a strategic position in regional and global energy markets. However, to fully realize its energy potential, Azerbaijan must navigate a complex landscape shaped by shifting global trends and evolving domestic needs. The global push for decarbonization, fluctuations in energy prices, and technological advancements are redefining how energy is produced, distributed, and consumed. At the same time, internal factors such as population growth, industrial modernization, and the diversification of the national economy are increasing energy demand within the country. This study aims to explore the intersection of global energy developments and domestic consumption trends, offering a comprehensive assessment of Azerbaijan's energy prospects in the context of these dynamic conditions. A nuanced understanding of both external and internal demand drivers is essential for shaping an effective and resilient energy policy (Aliyev, A., & Azizov, T., 2018: p. 224).

On the global stage, Azerbaijan must remain competitive by aligning its energy exports with international market trends, including the growing emphasis on clean energy and energy security. Strategic partnerships, diversification of export routes, and investment in energy infrastructure are key components that will determine the country's long-term success in global energy markets. Domestically, the government's commitment to energy efficiency, renewable energy development, and sustainable growth plays a vital role in meeting the rising energy needs of various sectors. Efforts to modernize the energy system, reduce losses, and integrate smart technologies reflect Azerbaijan's focus on creating a more reliable and environmentally friendly energy network. By evaluating the broader implications of global transformations alongside domestic priorities, Azerbaijan can adopt a forward-looking approach that not only supports economic development but also strengthens its position as a reliable energy partner on the international stage.

Table 1

Overview of Azerbaijan's energy production, domestic demand, and export trends

in the context of global energy demand

Year	Azerbaijan's Energy Production (million tons of oil equivalent)	Domestic Energy Demand (million tons of oil equivalent)	Oil Exports (million tons)	Gas Exports (billion m ³)	Global Energy Demand (billion tons of oil equivalent)
2015	51	18	38	10.2	13.7
2018	50	19.5	36.5	11.5	14.1
2020	48	20	34	12.3	13.6 (COVID-19 impact)
2022	49	21.2	35.1	14.5	14.4

Source: Guliyev, T., & Mammadov, D. (2022). Enhancing the Competitiveness of Azerbaijan's Energy Sector through Strategic Government Policies: A Porter's Diamond Approach. *International Journal of Public Administration*, 45(3), 283-301.

From 2015 to 2022, Azerbaijan's energy production, domestic energy demand, oil exports, gas exports, and global energy demand showed significant developments. In 2015, Azerbaijan's total energy production was 51 million tons of oil equivalent, with domestic energy demand at 18 million tons. Oil exports during this period were 38 million tons, and gas exports stood at 10.2 billion cubic meters. Global energy demand was 13.7 billion tons of oil equivalent. In 2018, energy production decreased slightly to 50 million tons of oil equivalent. Domestic energy demand increased to 19.5 million tons, while oil exports were 36.5 million tons, and gas exports grew to 11.5 billion cubic meters. Global energy demand also rose to 14.1 billion tons of oil equivalent. In 2020, due to the impact of the COVID-19 pandemic, global energy demand decreased to 13.6 billion tons of oil equivalent. Azerbaijan's energy production was 48 million tons of oil equivalent, and domestic energy demand rose to 20 million tons. Oil exports dropped to 34 million tons, while gas exports increased to 12.3 billion cubic meters. In 2022, Azerbaijan's energy production slightly increased to 49 million tons of oil equivalent, with domestic energy demand rising to 21.2 million tons. Oil exports were 35.1 million tons, and gas exports grew to 14.5 billion cubic meters. Global energy demand reached 14.4 billion tons of oil equivalent. Overall, Azerbaijan's energy sector showed growth in energy production, with an increase in domestic energy demand. Oil and gas exports remained significant during this period, reflecting changes in both Azerbaijan's energy policies and the global energy market.

Table 2

Sectoral breakdown of domestic energy consumption in Azerbaijan (2015–2022)

Year	Industry (%)	Transport (%)	Residential (%)	Agriculture (%)	Others (%)
2015	32	24	28	6	10
2017	34	23	27	6	10
2019	35	22	28	5	10
2020	33	20 (COVID-19 impact)	30	6	11
2022	36	23	27	5	9

Source: Guliyev, T., & Mammadov, D. (2022). Enhancing the Competitiveness of Azerbaijan's Energy Sector through Strategic Government Policies: A Porter's Diamond Approach. *International Journal of Public Administration*, 45(3), 283-301.

The table illustrates the sectoral distribution of domestic energy consumption in Azerbaijan between 2015 and 2022. It highlights how different sectors contribute to overall energy use, revealing key patterns in the country's internal energy demand. Industry consistently accounts for the largest share of energy consumption, reflecting Azerbaijan's focus on industrial development and energy-intensive production activities. The residential sector also represents a significant portion of consumption, indicating high levels of household energy use, particularly for heating, cooking, and electricity. Transport remains another major consumer, though its share experienced a temporary decline in 2020 due to reduced mobility during the COVID-19 pandemic. Agriculture, while less energy-intensive overall, maintains a steady share due to mechanized farming and irrigation needs. The "Others" category includes public institutions, commercial buildings, and services, and its contribution remains relatively stable over the years. This breakdown demonstrates the importance of sector-specific strategies in managing energy efficiency and meeting future domestic demand in a sustainable way.

Table 3

Azerbaijan's renewable energy potential and actual generation (2018–2024)

Year	Solar Potential (MW)	Wind Potential (MW)	Actual Solar Generation (GWh)	Actual Wind Generation (GWh)	Share of Renewables in Total Generation (%)
2018	23,000	3,000	42	60	2.2%
2019	23,000	3,000	51	72	2.5%
2020	23,000	3,000	48	70	2.4%
2022	23,000	3,000	63	91	3.1%
2024*	23,000 (est.)	3,000 (est.)	80 (est.)	120 (est.)	4.0% (est.)

Source: Caspian News. (2024, June 7). Azerbaijan Boosts Clean Energy Transition with Three Renewable Energy Projects. Caspian News.

The table provides an overview of Azerbaijan's renewable energy potential and actual electricity generation from solar and wind sources between 2018 and 2024. It shows that while the country has a substantial theoretical capacity - estimated at 23,000 MW for solar and 3,000 MW for wind—the actual utilization of this potential remains relatively modest. Nevertheless, there is a clear upward trend in renewable energy generation over the observed period. Solar energy production increased from 42 GWh in 2018 to an estimated 80 GWh in 2024, while wind energy generation rose from 60 GWh to a projected 120 GWh in the same period. This gradual increase reflects Azerbaijan's growing focus on diversifying its energy mix and investing in sustainable energy sources. Despite this progress, the share of renewables in the country's total electricity generation remains relatively low, rising from 2.2% in 2018 to an estimated 4.0% by 2024. This indicates that while renewable energy is gaining momentum, there is still significant room for expansion and policy support to fully leverage Azerbaijan's renewable energy potential.

Table 4

Electricity generation by energy source in Azerbaijan (2017–2023)

Year	Thermal Power (%)	Hydropower (%)	Solar (%)	Wind (%)	Other Renewables (%)
2017	91.2	7.8	0.5	0.4	0.1
2018	90.6	8.0	0.6	0.5	0.3
2019	89.8	8.7	0.7	0.5	0.3

2020	88.3	9.2	0.9	0.6	1.0
2021	87.5	9.5	1.1	0.7	1.2
2022	86.0	10.0	1.3	0.9	1.8
2023*	84.5 (est.)	10.5 (est.)	1.6 (est.)	1.1 (est.)	2.3 (est.)

Source: Caspian News. (2024, June 7). *Azerbaijan Boosts Clean Energy Transition with Three Renewable Energy Projects*. Caspian News.

The table provides a breakdown of electricity generation in Azerbaijan by energy source from 2017 to 2023. It highlights the dominance of thermal power plants, which continue to account for the largest share of electricity production in the country. Although thermal generation has slightly decreased over the years - from 91.2% in 2017 to an estimated 84.5% in 2023 - it remains the primary source, largely driven by the country's natural gas resources. Hydropower holds the second-largest share, gradually increasing from 7.8% in 2017 to an estimated 10.5% in 2023. This reflects efforts to make greater use of the country's river systems for energy production. Meanwhile, solar and wind energy, though still contributing relatively small portions, have shown consistent growth. Solar power increased from 0.5% to 1.6%, and wind power from 0.4% to 1.1% over the same period. The "Other Renewables" category, which includes bioenergy and other emerging sources, also grew modestly - from just 0.1% in 2017 to a projected 2.3% in 2023 - indicating a gradual diversification of the energy mix. Overall, the data shows a positive trend toward the inclusion of renewable energy sources, although fossil fuels still play a central role in Azerbaijan's electricity generation.

Azerbaijan's evolving energy landscape reflects both the country's traditional strengths in fossil fuel resources and its growing interest in sustainable alternatives. The gradual increase in the share of renewables in electricity generation illustrates ongoing efforts to diversify energy sources and reduce dependency on thermal power. Investments in hydropower, solar, and wind projects have contributed to this transition, supporting broader goals of energy security and environmental responsibility. In parallel, Azerbaijan is enhancing its regional role as a reliable energy supplier by expanding export routes and strengthening international partnerships. Strategic infrastructure projects, such as the Southern Gas Corridor, position the country as a key link between energy-rich regions and energy-consuming markets, particularly in Europe (Aliyev, A., & Azizov, T., 2018: p. 224). Domestically, meeting the increasing energy needs of a growing population and a developing economy remains a priority. This requires not only expanding generation capacity but also improving energy efficiency across sectors, upgrading grid infrastructure, and fostering innovation in clean technologies. A balanced energy policy that integrates economic, environmental, and geopolitical considerations will be essential to ensure Azerbaijan's energy resilience in the years ahead. To support this vision, Azerbaijan has begun implementing reforms aimed at liberalizing the energy market, attracting foreign investment, and encouraging private sector participation in renewable energy projects. These steps are intended to create a more competitive and transparent energy environment that can drive innovation and long-term sustainability (Zeynalov, F., & Ismailova, N., 2021: p. 135).

Education, research, and capacity-building initiatives are also becoming increasingly important as the country transitions toward a more diversified energy system. Developing local expertise in areas such as renewable energy technologies, smart grid systems, and energy efficiency management will be key to maintaining progress and adapting to global trends. Furthermore, Azerbaijan's commitment to international climate goals, including the Paris Agreement, underscores the country's intention to align its energy strategy with sustainable development principles. By promoting cleaner technologies and reducing greenhouse gas emissions, Azerbaijan aims to strike a balance between economic growth and environmental stewardship.

CONCLUSION

Azerbaijan's energy sector stands at a critical juncture, shaped by both internal development needs and dynamic global energy trends. The country's historically strong position in fossil fuel production, particularly oil and natural gas, has secured its role as a strategic energy supplier in the region and beyond. However, the global shift toward low-carbon economies, the increasing focus on renewable energy, and rising environmental concerns require Azerbaijan to adapt and modernize its energy strategy. Analysis of production, consumption, and export data demonstrates that while Azerbaijan continues to rely heavily on thermal energy generation and fossil fuel exports, notable progress is being made toward energy diversification. The gradual growth in renewable energy generation, particularly from solar and wind sources, reflects a strategic response to changing market dynamics and sustainability goals. At the same time, rising domestic energy demand - driven by industrial development, population growth, and infrastructure expansion - necessitates greater investment in energy efficiency and grid modernization. Azerbaijan's efforts to strengthen regional energy cooperation, expand export routes (such as the Southern Gas Corridor), and implement regulatory reforms signal a forward-looking approach that prioritizes resilience, competitiveness, and environmental responsibility. To ensure long-term energy security and economic sustainability, it is essential to accelerate the deployment of clean technologies, enhance institutional capacity, and foster innovation in the energy sector. In conclusion, Azerbaijan's energy prospects depend on its ability to effectively balance traditional energy exports with the growing imperatives of green transition and domestic development. A strategic, integrated, and adaptive energy policy will be crucial for navigating future challenges and capitalizing on emerging opportunities in the global energy landscape.

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Azərbaycandan olan enerjiyə qlobal və daxili tələb şərtlərinin qiymətləndirilməsi

Xülasə

Azərbaycanın enerji ixrac potensialını şərtləndirən əsas amillərdən biri həm qlobal, həm də daxili tələbat şəraitinin qiymətləndirilməsidir. Qlobal miqyasda enerji resurslarına tələbat iqtisadi artım, sənayeləşmə səviyyəsi, ekoloji tənzimləmələr və texnoloji irəliləyişlər kimi amillərlə formalaşır. Xüsusilə, inkişaf etməkdə olan ölkələrdə artan sənaye və nəqliyyat ehtiyacları enerji istehlakını yüksəldir. Bu kontekstdə Azərbaycan öz enerji ehtiyatlarını, xüsusilə neft, təbii qaz və alternativ enerji mənbələrini beynəlxalq bazarlara çıxarmaqla qlobal enerji təhlükəsizliyinə töhfə verir. Ölkə daxilində enerji tələbatına əhəlinin artımı, sənaye və kənd təsərrüfatının inkişafı, yeni texnologiyaların tətbiqi təsir göstərir. Enerji səmərəliliyinə və bərpa olunan enerjinin təşviqinə yönəlmiş hökumət təşəbbüsləri də daxili enerji mənzərəsinin formalaşdırılmasında mühüm rol oynayır. Bundan əlavə, daxili enerji siyasətinin prioritetlərindən biri iqtisadiyyatın şaxələndirilməsi və enerji istehlakının optimallaşdırılmasıdır. Azərbaycanda sənayenin modernləşdirilməsi və yeni texnologiyaların tətbiqi enerji istehlakının strukturuna təsir göstərməklə daha sabit və dayanıqlı enerji təchizatı mexanizmlərinə zəmin yaradır. Eyni zamanda, kənd təsərrüfatında və regional inkişafda artan enerji tələbatı daxili bazarda balanslaşdırılmış və çevik enerji strategiyalarının həyata keçirilməsini zəruri edir. Qlobal enerji qiymətlərindəki dalğalanmalar və dəyişən geosiyasi dinamikalar Azərbaycanın enerji sektoruna da birbaşa təsir göstərir. Rəqabətə davamlı qalmaq və uzunmüddətli sabitliyi təmin etmək üçün Azərbaycan davamlı olaraq beynəlxalq bazar tendensiyalarını qiymətləndirməli və ixrac strategiyalarını buna uyğun şəkildə tənzimləməlidir. Bundan əlavə, günəş və külək enerjisi kimi bərpa olunan enerji mənbələrinə investisiyalar təkcə ətraf mühitlə bağlı öhdəlikləri yerinə yetirmək üçün deyil, həm də qalıq yanacaqlardan asılılığı azaltmaq və enerji təhlükəsizliyini artırmaq üçün getdikcə daha vacib olur. Ümumilikdə, həm qlobal, həm də daxili enerji tələbi şərtlərinin hərtərəfli başa düşülməsi Azərbaycanın regionda və onun hüddudlarından kənarda əsas enerji təchizatçısı kimi mövqeyini qoruyacaq strateji siyasətlərin formalaşdırılması üçün vacibdir.

Açar sözlər: qlobal enerji tələbatı, fosil yanacaqlar, enerji təhlükəsizliyi, enerji strategiyası, enerji təchizatının sabitliyi.