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From Fossil Fuels to Renewables: New Opportunities for Azerbaijan's Energy Security

Fosil Yakıtlardan Yenilenebilir Enerjiye Geçiş: Azerbaycan'ın Enerji Güvenliği İçin Yeni Fırsatlar

Abstract

This article examines the main barriers and opportunities related to renewable energy development in Azerbaijan, focusing on national energy security and business-sector growth. It identifies structural factors slowing renewable energy expansion and proposes policy measures to attract investment, improve infrastructure, and promote sustainable energy use. The study is based on semi-structured interviews, comparative analysis of international experience, and assessment of Azerbaijan's legal and institutional framework. The findings indicate that limited investor participation remains a major constraint, as high initial costs reduce the capacity of small and medium-sized enterprises to adopt renewable technologies. Additional barriers include insufficient legislation, weak grid-balancing capacity, limited land availability, and inadequate energy storage systems. The study emphasizes the importance of Power Purchase Agreements, Feed-in Tariffs, Green Certificates, and fiscal incentives in creating a supportive market environment. It concludes that integrated regulatory reform, infrastructure modernization, financial support, and human capital development are essential for strengthening energy security, diversifying the economy, and generating new business opportunities.

Keywords: *Azerbaijan, business sector, energy policy, energy security, renewable energy*

Öz

Bu makale, Azerbaycan'da yenilenebilir enerji gelişiminin önündeki temel engelleri ve fırsatları, ulusal enerji güvenliği ile iş dünyasının büyümesi çerçevesinde incelemektedir. Çalışma, yenilenebilir enerji genişlemesini yavaşlatan yapısal unsurları belirlemekte ve yatırım çekmeye, altyapıyı geliştirmeye ve sürdürülebilir enerji kullanımını teşvik etmeye yönelik politika önerileri sunmaktadır. Araştırma; yarı yapılandırılmış görüşmelere, uluslararası deneyimlerin karşılaştırmalı analizine ve Azerbaycan'ın hukuki ile kurumsal çerçevesinin değerlendirilmesine dayanmaktadır. Bulgular, sınırlı yatırımcı katılımının başlıca kısıtlardan

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biri olduğunu göstermektedir; çünkü yüksek başlangıç maliyetleri, küçük ve orta ölçekli işletmelerin yenilenebilir enerji teknolojilerini benimseme kapasitesini azaltmaktadır. Diğer engeller arasında yetersiz mevzuat, zayıf şebeke dengeleme kapasitesi, sınırlı arazi imkânları ve enerji depolama sistemlerindeki eksiklikler yer almaktadır. Çalışma, Enerji Satın Alma Anlaşmaları, Alım Garantili Tarifeler, Yeşil Sertifikalar ve mali teşviklerin destekleyici bir piyasa ortamı oluşturmadaki önemini vurgulamaktadır. Sonuç olarak düzenleyici reformlar, altyapı modernizasyonu, finansal destek ve beşerî sermaye gelişimi; enerji güvenliğinin güçlendirilmesi, ekonominin çeşitlendirilmesi ve yeni ticari fırsatların yaratılması açısından kritik öneme sahiptir.

Anahtar Kelimeler: *Azerbaycan, iş dünyası, enerji politikası, enerji güvenliği, yenilenebilir enerji*

Introduction

In the contemporary era, the inevitability of depleting fossil fuel resources has become increasingly evident. Alongside this depletion, the steady rise in the cost of traditional energy sources signals a pressing challenge for global economies. The environmental consequences of extracting and consuming these fuels further exacerbate the problem, as their exploitation continues to damage ecosystems, accelerate climate change, and threaten sustainable development on a planetary scale.

In this context, renewable energy emerges as both an ecological necessity and a strategic opportunity. Unlike conventional fuels, renewable resources offer a cleaner and more sustainable alternative, reducing harmful emissions while ensuring a long-term energy supply. As such, the exploration of renewable energy sources, the development of innovative methods of their utilization, and the comprehensive evaluation of their environmental and economic impacts have become central issues in today's global energy discourse.

For Azerbaijan, these questions carry particular weight. Although the country's economy has historically been tied to oil and gas, the potential exhaustion of non-renewable reserves underscores the urgency of diversifying the energy sector. Recent efforts to develop renewables demonstrate a growing awareness of this need, yet the business implications of such a transition remain underexplored. Enterprises that continue to rely heavily on fossil fuels must adapt to changing market conditions, while those integrating renewable energy into their operations stand to benefit from improved efficiency, reduced costs, and enhanced global competitiveness.

International experience clearly shows that investments in renewable energy not only address environmental concerns but also strengthen economic resilience. For Azerbaijan, adopting such strategies can play a crucial role in reinforcing national energy security, ensuring a stable energy supply, and reducing dependence on volatile fossil fuel markets. Assessing the current state of renewables in Azerbaijan, identifying barriers to their growth, and evaluating their potential impact on both the economy and the environment are therefore vital steps in shaping sustainable energy policies.

Ultimately, the transition from fossil fuels to renewables represents more than a technological shift; it is a strategic transformation. For Azerbaijan, it creates new opportunities to secure its energy

future, diversify its economy, and position itself as a forward-looking state capable of balancing ecological responsibility with economic prosperity (Bədəlov, 2014).

The development of renewable energy in Azerbaijan can be understood by examining both global trends and local conditions. Energy, defined as the capacity to perform work, is essential for industrial operations and human welfare, with electricity being the most widely consumed form, followed by oil, coal, and natural gas for heating and industrial purposes. However, fossil fuel reserves are finite, and their depletion, together with geopolitical competition over energy resources, has driven nations, including Azerbaijan, to explore alternative energy solutions.

Globally, renewable energy has evolved through several key stages (Azərbaycan Respublikası Prezidenti, 2013): Early experimentation (19th–early 20th century): Small-scale use of wind, water, and solar energy emerged for localized applications. Early windmills, hydroelectric facilities, and basic solar collectors were developed, although their impact remained limited. Industrial expansion (mid-20th century): Hydropower gained prominence in supplying energy to emerging industries, while solar and wind technologies remained largely experimental. Fossil fuels continued to dominate energy production worldwide. Environmental awareness and policy initiatives (1970s–1990s): Rising environmental concerns and the energy crises of the 1970s encouraged research and policy support for renewable energy. Incentives such as feed-in tariffs and subsidies began in developed countries, promoting solar, wind, and biomass energy. Modern integration (2000s–present): Technological advances, cost reductions, and supportive policies have made renewable energy a central part of global and national energy strategies. Today, these resources contribute to electricity generation, energy security, and sustainable development. In Azerbaijan, where the current share of alternative energy remains limited, these stages provide a useful framework for future development. By adopting lessons from global practice, including regulatory incentives, grid integration, and capacity building, Azerbaijan can enhance its renewable energy sector, reduce reliance on fossil fuels, and improve national energy security while fostering business and industrial growth.

Theory

Energy is generally understood as the ability to perform work. From an industrial perspective, any type of energy resource that serves human comfort and economic progress is considered a primary field of activity for engineers and policymakers. Today, the most essential form of energy consumption is electricity, followed by oil, coal, and natural gas, which are used mainly for heating, transport, and industrial purposes. However, current developments clearly demonstrate that coal, oil, and natural gas reserves are finite, while geopolitical tensions surrounding access to these resources have repeatedly

affected international stability and market conditions. These processes have also contributed to rising energy prices, compelling countries to seek new ways to meet their energy needs. Against this backdrop, new energy sources known as alternative energy resources have gained increasing importance. Like every sector, this field has passed through distinct historical stages of development.

This discussion highlights one of the central challenges facing modern economies: the depletion and geopolitical vulnerability associated with fossil fuels. For Azerbaijan, a country traditionally dependent on oil and gas, this reality underscores the urgent need to diversify its energy portfolio. As fossil resources decline and global competition intensifies, Azerbaijan must expand investment in renewable and alternative energy sources in order to ensure long-term energy security (Azərbaycan Respublikası Prezidenti, 2013). By understanding the historical evolution of energy use—from dependence on coal and oil to the modern predominance of electricity and the emerging shift toward renewables—Azerbaijan can better position itself within the global energy transition. Developing alternative energy not only reduces dependence on volatile fossil fuel markets but also creates new opportunities for technological innovation, economic growth, and ecological sustainability.

In this sense, the transition from fossil fuels to renewables represents a strategic step for Azerbaijan to safeguard its energy security, strengthen resilience against global price shocks, and contribute to international climate objectives (United Nations, 2015). At present, Azerbaijan does not yet host large-scale corporations dedicated exclusively to the renewable energy sector. Nevertheless, several domestic enterprises are involved in implementing projects in this area, although many of these initiatives remain production-oriented and focus primarily on pilot programs or infrastructure-based activities. A significant gap identified during the present analysis is the limited number of enterprises that integrate renewable energy into consumer-level operations or utilize such resources as part of their broader management strategy. This indicates that, while the technological potential of alternative energy systems could in principle serve almost any enterprise, the practical integration of renewables into Azerbaijan's wider business environment remains constrained. Understanding the barriers to this transition is therefore essential. Among the key challenges are an underdeveloped institutional framework, limited investment incentives, insufficient awareness among enterprises, and the absence of strong market leaders capable of demonstrating successful large-scale adoption. These obstacles have slowed the diffusion of renewable energy technologies across sectors. To assess the actual impact of renewables on Azerbaijan's business environment, it is necessary to apply quantitative and comparative analytical approaches. Given that renewable energy practices are not yet widespread and

domestic experience remains relatively modest, such methods enable a more objective evaluation of potential economic and operational outcomes.

Another critical factor shaping the feasibility of renewable energy use in Azerbaijan is electricity pricing. The cost of electricity per kilowatt-hour plays a decisive role in determining whether businesses perceive renewables as a viable alternative to conventional energy sources. Therefore, analyzing tariff structures, subsidies, and cost-benefit dynamics is indispensable for evaluating both the opportunities and constraints associated with the transition toward sustainable energy (Tariff Council of the Republic of Azerbaijan, 2025; State Statistical Committee of the Republic of Azerbaijan, 2025).

Within the broader context of the transition from fossil fuels to renewables, this analysis underlines the importance of strengthening institutional support, creating financial incentives, and fostering innovative business models. Only by addressing these barriers can Azerbaijan fully unlock the potential of renewable energy to diversify its economy, reduce reliance on fossil fuels, and enhance long-term national energy security.

Table 1: Prices per kWh for electricity set by the Tariff Council
(Tariff Council of the Republic of Azerbaijan, 2025).

Consumer Category	Consumption Level	Price (AZN per kWh)
Household consumers	up to 200 kWh per month	0.08
Household consumers	200–300 kWh per month	0.09
Household consumers	above 300 kWh per month	0.13
Commercial consumers	standard tariff	0.11
Industrial consumers	standard tariff	0.11

According to the 2025 electricity tariff statistics, businesses in Azerbaijan currently pay around 9 qepiks per kWh for electricity generated from conventional sources. By contrast, electricity produced from alternative or renewable energy systems ranges between 5.0 and 5.7 qepiks per kWh. This price differential suggests that renewable energy can provide clear economic advantages through lower operating costs, stronger enterprise competitiveness, and positive spillover effects for the national economy (Tariff Council of the Republic of Azerbaijan, 2025; State Statistical Committee of the Republic of Azerbaijan, 2025).

To formulate effective recommendations, it is first necessary to identify the existing obstacles. In this study, both international experiences and insights from Azerbaijani enterprises were taken into consideration. A qualitative oral survey method was applied to gather first-hand information from organizations operating in the country. This methodological approach enables a more precise

understanding of structural problems, ranging from policy gaps to infrastructure deficiencies, and provides an empirical basis for practical recommendations. Through the oral survey method, several organizations were contacted, although only three companies—Azgüntex LLC, AzAlternativEnerji, and Helind—provided feedback. Their responses made it possible to identify the principal obstacles constraining the renewable energy sector in Azerbaijan, together with potential solutions.

Key barriers identified in the literature include the absence of a feed-in tariff system, lack of investors, underdeveloped market mechanisms, an incomplete centralized legislative framework, insufficient grid-balancing mechanisms for electricity sales to the network, limited availability of land plots, barriers in renewable energy procurement processes, and the absence of large-scale energy storage infrastructure (Gielen et al., 2014).

Feed-in Tariff

International experience demonstrates that feed-in tariff systems play a crucial role in accelerating renewable energy adoption, production, and consumption. If Azerbaijan seeks to stimulate business growth in this field, implementing such a mechanism would be of strategic importance.

For example, if an enterprise establishes renewable energy facilities capable of generating 500 kWh of electricity per day and only half of this output is required for internal consumption, the remaining electricity could potentially be sold to the grid. In the absence of a feed-in tariff framework, however, enterprises face limited opportunities to monetize surplus generation.

International practice offers relevant lessons. Germany introduced its Feed-in Tariff Law in 2000 as a strategic instrument for promoting renewable energy. The framework guaranteed producers a fixed purchase price for each kilowatt-hour of electricity supplied to the grid, generally over long-term contractual periods. It was designed not only to increase the share of renewables in electricity production but also to reduce emissions, strengthen environmental sustainability, and improve long-term market confidence (Gielen et al., 2014). Adopting a comparable policy model in Azerbaijan could provide renewable energy producers with greater financial predictability, stimulate private investment, and establish a reliable basis for the gradual expansion of renewable energy technologies.

A further determinant of sectoral development is the presence of investment capital. Investors are particularly important in the realization of large-scale energy projects. According to cost analyses published by Lazard, establishing and commissioning renewable energy systems such as wind and solar facilities requires substantial upfront capital expenditure. For example, a 1 MW installation may require investment of approximately USD 1 million, depending on technology choice, location, and financing

conditions. Under such circumstances, it becomes difficult for small and medium-sized enterprises to participate in the sector without external financing support (Lazard Ltd., 2023).

To address this challenge, one recommendation is the establishment of state-supported incentive programs before large-scale private investment occurs. These may include targeted subsidies for SMEs, direct support for renewable installations, tax incentives, or concessional financing schemes. Another option would be to engage international companies through structured agreements that ensure investor confidence while maintaining balanced returns. The incentive for both domestic and foreign investors lies in long-term revenue opportunities derived from surplus energy sales and certification mechanisms.

This perspective is also reflected in consultations with sector representatives, who emphasized the practical value of green certificates and surplus power purchase mechanisms. Under such systems, entities generating excess energy can sell electricity to nearby regions or companies, thereby creating stronger incentives for production beyond internal demand.

However, the absence of a mature market mechanism in Azerbaijan constrains the development of the competitive environment required for such schemes to function sustainably. By contrast, international experience demonstrates that long-term policy continuity, low-interest financing tools, and targeted support programs can significantly encourage renewable energy investment over time. Accordingly, strengthening investor participation remains essential for Azerbaijan's transition from fossil fuels to renewable energy and for expanding new opportunities linked to long-term national energy security.

Lack of a Centralized Legislative Framework

Our research indicates that, while the President of Azerbaijan has enacted several programs, decrees, and policy measures related to renewable energy, these steps, although important at the initial stage, remain insufficient for ensuring sustained sectoral development. At the international level, commitments adopted under the Paris Agreement encourage countries, including Azerbaijan, to strengthen energy transition policies and increase the role of renewable energy within national systems. The Paris Agreement does not impose a uniform renewable energy quota; rather, each signatory determines its own targets through nationally determined contributions (NDCs). Within this framework, Azerbaijan has committed itself to increasing the share of renewable sources in the energy sector and reducing carbon emissions (United Nations, 2015; Republic of Azerbaijan, 2021).

The absence of a centralized renewable energy law creates the need to examine successful international legal models. Germany's *Stromeinspeisungsgesetz* (StrEG) provides an important historical

example. Introduced in the early 1990s, StrEG established legal incentives for electricity generation from solar, wind, hydro, and biomass sources. Compensation mechanisms linked payments to electricity supplied to the grid, thereby improving financial viability and encouraging wider participation.

A more comprehensive framework was later introduced through the Renewable Energy Sources Act (EEG), which entered into force in 2000. The EEG expanded support mechanisms by introducing long-term feed-in tariff guarantees, priority grid access for renewable electricity, and differentiated tariff levels depending on technology type. These measures increased investor confidence and played a major role in the rapid expansion of renewable energy capacity in Germany (Gielen et al., 2014).

Clarifying the distinction between StrEG and EEG is important for understanding the institutional evolution of Germany's renewable energy policy. While StrEG laid the legislative foundation, the EEG created a more structured and stable support mechanism that enabled large-scale investment in renewable technologies.

Lack of Grid-Balancing Systems to Enable Energy Sales

Our business-sector analysis highlights another critical challenge: while enterprises may initially consume renewable energy for internal purposes, the ability to sell surplus energy becomes increasingly necessary over time. This issue is particularly relevant for companies seeking to operate as renewable energy suppliers. Addressing it requires the establishment of grid-balancing systems capable of managing two-way energy flows and integrating excess generation into the market.

Given that renewable energy in Azerbaijan is still at an early stage of development, it is essential to establish dedicated technical teams and involve international expertise in implementing such systems effectively. Without adequate grid management, the commercialization of renewable energy remains constrained, limiting sectoral growth and reducing investment attractiveness.

Method

The methodological basis of this research relies on comparative methods that allow an assessment of the applicability and efficiency of alternative energy systems. Within this framework, Azerbaijan's historical experience, together with statistical evidence derived from that experience, provides an important basis for evaluation.

This comparative approach enables a deeper understanding of how renewable energy can respond to Azerbaijan's long-term energy challenges. By analyzing the country's historical dependence on fossil fuels and contrasting it with the emerging potential of renewable sources, the study highlights both the structural limitations of traditional energy dependence and the strategic advantages of

transition. Such a methodology reveals economic and ecological benefits while also offering practical insights into how Azerbaijan can strengthen energy security and diversify its economy.

This research adopts a qualitative methodological framework supported by comparative analysis in order to examine the challenges and opportunities associated with renewable energy expansion in Azerbaijan. A qualitative design was considered the most appropriate approach because the application of renewable energy technologies within the Azerbaijani business environment remains relatively limited. Therefore, expert insight and practical experience from organizations operating in this field were necessary for understanding the present situation.

The study seeks to identify the principal institutional, economic, and technological barriers influencing the adoption of renewable energy solutions in Azerbaijan. At the same time, it examines international policy experiences in order to determine which practices may be adapted to the national context. Within this perspective, countries that have successfully integrated renewable energy into their systems were used for comparative evaluation.

Germany was selected as the primary reference country because of its extensive experience in renewable energy governance and its established support mechanisms, including feed-in tariffs and comprehensive legislative regulations. The comparative evaluation focuses on regulatory structures, financial incentive mechanisms, market organization, and policies supporting electricity grid integration.

Data Collection

The research utilizes both primary and secondary sources of information. Primary data were obtained through semi-structured interviews with representatives of organizations involved in renewable energy activities in Azerbaijan. A purposive sampling strategy was used to identify companies with relevant expertise and direct involvement in renewable energy initiatives or related infrastructure projects.

Three organizations participated in the study: Azgüntex LLC, AzAlternativEnerji, and Helind Company. These companies were selected because they possess practical experience in renewable energy implementation and are familiar with the operational and structural challenges encountered in this field. In total, three expert interviews were conducted.

The interviews followed a semi-structured format, allowing respondents to elaborate on their perspectives while maintaining consistency across key themes. These themes included major barriers to renewable energy development, financial and investment-related constraints, the adequacy of the

legislative framework, technical limitations associated with grid infrastructure and storage technologies, and opportunities for increasing business-sector participation in renewable energy production and use.

In addition to primary data, the research incorporates secondary materials, including official statistical reports published by the State Statistical Committee of Azerbaijan, government strategies and policy documents, and international publications examining global renewable energy trends and regulatory practices.

Data Analysis

The qualitative data collected from the interviews were processed through thematic content analysis. Responses were carefully reviewed and organized into thematic categories representing the principal challenges and prospects within the renewable energy sector. This process enabled the identification of recurring patterns such as legislative deficiencies, limited financial incentives, infrastructure constraints, and shortages of private investment.

Following the qualitative stage, the findings were interpreted within a comparative framework informed by international policy experience. Germany's renewable energy governance model served as a benchmark, particularly regarding its feed-in tariff mechanism, comprehensive legislative support, and investment-friendly policy environment.

By combining expert insights, comparative policy analysis, and statistical evidence, the study offers a multidimensional evaluation of the current state of renewable energy development in Azerbaijan. The findings also contribute to identifying policy directions that may support the country's transition toward renewable energy while strengthening national energy security and expanding opportunities for business-sector participation.

Limited Availability of Land for Renewable Energy Installations

In addition to capital requirements, land availability is a critical factor affecting the adoption of renewable energy systems by enterprises in Azerbaijan. Many businesses lack sufficient space to install solar panels, wind turbines, or other forms of renewable infrastructure. Where installations must be located close to the enterprise, relocation to less urbanized areas may become necessary, creating additional operational burdens.

To mitigate these challenges, two strategies appear particularly relevant. First, rooftop systems should be prioritized for individual enterprises in order to utilize existing surfaces efficiently. Second, centralized renewable energy facilities may be established in strategically suitable locations serving clusters of enterprises. Where transmission distances are substantial, international technical expertise

becomes important for ensuring safety, efficiency, and reliability. These measures could help overcome spatial constraints while broadening access to renewable energy for the industrial sector.

Barriers to Renewable Energy Procurement

For business owners who lack the capacity to install renewable energy systems on-site, access to green tariff mechanisms can be important for improving corporate image and demonstrating sustainability commitments. In such circumstances, enterprises typically rely on long-term contracts with private or public energy suppliers in order to secure renewable electricity. Internationally, these agreements are known as Power Purchase Agreements (PPAs) (Ministère de la Transition Écologique, 2021; Federal Energy Regulatory Commission, 2022).

Introducing PPAs in Azerbaijan could have a significant effect on the business sector. Through such agreements, enterprises can procure clean electricity under predictable pricing structures while maintaining long-term supply security. International practice shows that PPAs have become an important instrument in multiple jurisdictions for facilitating renewable energy procurement and reducing uncertainty in energy planning (Federal Energy Regulatory Commission, 2022).

Lack of Energy Storage Systems

Another critical factor limiting the effectiveness of renewable energy in Azerbaijan is the absence of adequate energy storage solutions. For example, if a business installs a solar energy system but cannot consume all electricity generated during the day, and no feed-in tariff mechanism exists, surplus energy may be lost. This creates operational inefficiencies, especially because solar output varies according to seasonal and daily weather conditions.

To ensure continuity of operations, enterprises require storage systems such as industrial battery technologies capable of retaining excess electricity for later use. Although the cost of such systems may be prohibitive for smaller firms, medium-sized and large enterprises may derive substantial benefits from their deployment. One practical approach identified in interviews involves contractual mechanisms through which surplus electricity is supplied to the grid at a predetermined rate and later retrieved for internal use under agreed conditions. Such arrangements could reduce losses, improve operational reliability, and optimize the utilization of renewable energy resources.

Conclusion

Before presenting the conclusions and recommendations, it is important to note that the business sector in Azerbaijan currently demonstrates only limited engagement with renewable energy. Therefore, the findings and recommendations derived from this research primarily address the

potential direct and indirect effects that wider renewable energy adoption may generate for business development and long-term economic transformation.

Weak Legislative Framework

The first major finding concerns the insufficiency of the legislative environment governing renewable energy in Azerbaijan. Comparative analysis of countries that have achieved substantial progress in renewable energy indicates that these states prioritized the creation of clear and sector-specific legal frameworks during the early phases of transition. By contrast, Azerbaijan has adopted a more limited set of laws, decrees, and policy instruments, which appear insufficient to stimulate broad participation and sustained investment from both public and private actors (Azərbaycan Respublikası Prezidenti, 2013; Azərbaycan Respublikası Prezidenti, 2024).

Limited Incentive Programs

A second key observation is the absence of sufficiently broad incentive programs designed to support renewable energy adoption. International experience shows that governments often provide early-stage support mechanisms to accelerate renewable deployment, after which private enterprises continue sectoral expansion through market-based investment. In Azerbaijan, the limited scope of promotional measures has contributed to lower public awareness and slower market development. Strengthening incentive schemes could therefore play a decisive role in accelerating adoption and reducing investment hesitation (Gielen et al., 2014).

Insufficient Land Availability

The research also identifies land scarcity as a significant barrier. Survey findings suggest that dense urban construction patterns, combined with the limited suitability of some peripheral areas, restrict the ability of enterprises to install renewable energy systems. This spatial constraint remains an important obstacle to scaling renewable energy use across the business sector. Rooftop systems, industrial clusters, and shared infrastructure models may provide practical alternatives where direct land access is limited.

As the renewable energy sector develops further, activities such as selling electricity to the grid, purchasing electricity from producers, and organizing energy auctions will increasingly depend on mechanisms such as Feed-in Tariffs (FiTs), Green Certificates, and structured market regulations. The introduction of these systems could enable both public and private actors to generate income from renewable energy while attracting a wider range of stakeholders and supporting infrastructure growth. On the basis of international practice, the incorporation of such instruments into Azerbaijan's legal framework would represent a significant institutional step.

Promotion and Awareness Programs

An important step in fostering sectoral growth is the organization of seminars, workshops, and conferences aimed at informing businesses about the economic and environmental advantages of renewable energy systems. Once legislative mechanisms such as FiTs and certification systems are introduced, additional measures should include tax incentives, customs facilitation, and transparent electricity purchase and sale pricing frameworks. Subsidies, fiscal incentives, and awareness initiatives can collectively strengthen market development, improve business participation, and create favorable conditions for sustainable growth in the renewable energy sector.

Implementation of Renewable Energy Installations and Capacity Building

Based on the findings of the qualitative survey, the first stage in applying renewable energy solutions is to identify where energy demand is concentrated. Thereafter, the availability and technical suitability of land or building space should be assessed. Once appropriate sites are confirmed, installation and operational activities should be coordinated with representatives from public institutions and private firms already active in the renewable energy field. Such cooperation can improve efficiency, reduce implementation risks, and maximize the use of available expertise.

Addressing the Shortage of Skilled Personnel

Another critical issue is the shortage of qualified professionals in the renewable energy sector. To address this challenge, universities should integrate renewable energy courses into their curricula. The establishment of specialized laboratories would enable students to gain practical experience in system installation, operation, and management. Internship programs could also allow senior students to participate directly in energy projects, gradually creating a pool of skilled personnel who may later contribute to public institutions or private enterprises as the sector expands.

International experience further demonstrates that companies outside the traditional energy sector—including automotive, entertainment, technology, and design industries—have used renewable energy initiatives and sustainability certifications to strengthen their domestic and international reputations. Such certifications may also improve market perception and commercial performance. To encourage similar outcomes in Azerbaijan, awareness campaigns, educational initiatives, and promotional programs should be expanded in order to stimulate competition and broaden participation in the renewable energy transition.

Author Contributions

The author is solely responsible for the conceptualization, methodology, analysis, and writing of the study.

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