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SUSTAINABLE DEVELOPMENT STRATEGY IN AZERBAIJAN: ALTERNATIVE ENERGY ECONOMY

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Introduction

"Sustainable development" is commonly defined as development that satisfies the needs of the present without compromising the ability of future generations to meet their own needs [6, p. 4]. This concept has become the foundation for long-term policy planning at both national and global levels, aiming to balance economic progress with environmental stewardship and social equity. The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a universal framework that emphasizes the interdependence of economic growth, environmental protection, and inclusive social development. Within this framework, 17 Sustainable Development Goals (SDGs) guide national development priorities, with SDG 7 specifically calling for affordable, reliable, sustainable, and modern energy for all. In the case of Azerbaijan, the country's rapid economic expansion since independence has been largely fueled by oil and natural gas revenues. These fossil fuels continue to account for more than 90 % of the country's total exports, creating a significant dependency on a volatile and environmentally harmful resource base [2, p. 5]. However, this growth model is becoming increasingly unsustainable in the context of global decarbonization trends, fluctuating energy markets, and the mounting impacts of climate change. As a result, a strategic shift toward an alternative energy economy—centered on renewable energy sources such as solar, wind, and hydro—is not only a matter of environmental responsibility but also a national economic necessity. Transitioning to a more diversified and resilient energy mix will allow Azerbaijan to stabilize its revenue streams, reduce its greenhouse-gas emissions, and make tangible progress toward international commitments, including SDG target 7.2, which seeks to increase substantially the share of renewable energy in the global energy mix [5, p. 3].

Sustainable Development

Sustainable development is a multidimensional concept that integrates three foundational pillars: economic vitality, social equity, and environmental stewardship. These pillars are not isolated; rather, they interact in complex ways that shape national policy, investment decisions, and long-term societal well-being. Economically, sustainable development emphasizes inclusive growth, productivity, and innovation. Socially, it seeks to eliminate poverty, promote equality, and ensure access to basic services. Environmentally, it calls for the preservation of ecosystems, responsible natural resource management, and climate change mitigation. These principles are operationalized through the United Nations Sustainable Development Goals (SDGs), which offer a comprehensive roadmap for global progress by 2030. Of particular relevance are SDG 7, which aims to ensure access to affordable, reliable, sustainable, and modern energy for all; SDG 9, which promotes resilient infrastructure, inclusive industrialization, and innovation; and SDG 13, which urges immediate action to combat climate change and its impacts. These goals are interconnected and reinforce each other, forming the basis of a sustainable development strategy that promotes low-carbon economic growth, fosters poverty reduction, and enhances resilience to external shocks, including economic crises and environmental disasters [7, p. 1]. Within this framework, energy transition emerges as a linchpin that connects efficient resource use with wider socio-economic objectives. Moving from a fossil fuel-based economy to one driven by renewable energy sources supports job creation, enhances energy security, and contributes to emissions reduction—thereby fulfilling key targets under all three pillars of sustainability.

Sustainable Development Strategies in Azerbaijan

In addition to these national reforms, Azerbaijan has actively engaged in multilateral initiatives and regional cooperation to bolster its sustainable development agenda. The country participates in the EU-4Energy program, a European Union initiative that supports energy policy reform and data transparen-

cy in Eastern Partnership countries. This collaboration has enabled Azerbaijan to adopt best practices in energy planning and efficiency while facilitating regional integration in electricity and gas markets [2, p. 7]. Through this partnership, Azerbaijan also receives technical assistance to align its legislation with European energy directives, especially those concerning renewable energy integration and demand-side management.

Furthermore, the establishment of the Ministry of Energy's dedicated Renewable Energy Agency in 2021 marked a significant institutional step toward promoting alternative energy development. This agency is tasked with coordinating renewable energy projects, attracting foreign investment, conducting feasibility studies, and overseeing the implementation of solar and wind power initiatives. It serves as a key actor in executing the country's green transition, in coordination with other public and private stakeholders.

Efforts to localize the SDGs are also gaining traction in Azerbaijan, as evidenced by the inclusion of sustainability indicators in national budget planning and sectoral strategies. For example, environmental impact assessments (EIAs) are increasingly required for new infrastructure projects, particularly those funded through public-private partnerships. This ensures that large-scale investments align with Azerbaijan's environmental goals and international obligations under the UN Framework Convention on Climate Change (UNFCCC). Moreover, the integration of gender and social equity considerations into rural electrification and energy access programs reflects a growing understanding of the SDGs as a framework for inclusive development.

Azerbaijan has also initiated national dialogues on the circular economy, green jobs, and sustainable finance, in partnership with international organizations such as the UNDP, World Bank, and the International Renewable Energy Agency (IRENA). These discussions aim to foster innovation in waste management, energy-efficient building practices, and climate-smart agriculture—sectors that are crucial for reducing environmental degradation and promoting economic diversification. In parallel, financial institutions in Azerbaijan are beginning to explore green bonds and sustainability-linked loans, indicating an emerging interest in aligning capital markets with the country's green transition objectives.

Through these interconnected strategies, Azerbaijan is not only responding to global sustainability expectations but also reshaping its national development model. The convergence of energy policy, climate strategy, and socio-economic planning reflects a maturing governance approach that seeks long-term resilience rather than short-term gains. As the country advances toward its 2030 goals, continuous institutional reform, private sector engagement, and international cooperation will be essential to ensure the effectiveness and credibility of its sustainable development strategy.

Alternative Energy in the Sustainable Economy

Azerbaijan possesses significant untapped renewable energy potential that could substantially contribute to its sustainable development goals and economic diversification. According to the International Energy Agency (IEA), the country's theoretical renewable capacity includes approximately 23,000 megawatts (MW) from solar energy, 3,000 MW from wind power, 520 MW from small-scale hydropower, 800 MW from geothermal resources, and 380 MW from biomass [2, p. 26–27]. Despite these abundant resources, the share of renewables in the country's total primary energy supply remains strikingly low—just 1.5 % as of recent data—reflecting limited integration into the national energy mix [2, p. 6]. Furthermore, private investment in the renewable sector has remained minimal over the last decade, hindered by structural and regulatory constraints [4, p. 1].

Several key obstacles impede the rapid deployment of renewables in Azerbaijan. The energy sector continues to exhibit monopolistic characteristics, with state-owned enterprises dominating generation, transmission, and distribution. This market concentration limits competition and discourages independent power producers from entering the sector [3, p. 2]. Additionally, the legal and institutional framework for renewable energy is still in a nascent stage, lacking detailed secondary legislation and long-term enforcement mechanisms to ensure policy continuity. Although the Law on Using Renewable Energy Sources, adopted in 2021, was a notable milestone, the law's implementation remains incomplete. While it introduces important tools such as auctions, Power Purchase Agreements (PPAs), and net-metering schemes, specific capacity targets, monitoring systems, and financial guarante-

es are still being developed [2, p. 26].

To accelerate renewable energy deployment and attract investment, a series of coordinated policy measures are necessary. First, Azerbaijan should enhance the financial attractiveness of renewable projects by introducing robust feed-in tariffs and expanding competitive bidding mechanisms. These instruments help lower financing costs, reduce investor risk, and promote technological innovation [4, p. 6]. Second, administrative procedures for permitting, land acquisition, and grid connection must be streamlined. Current processes are often fragmented and opaque, leading to costly delays for project developers [1, p. 33].

Third, mobilizing concessional finance from multilateral development banks (MDBs) such as the World Bank and the Asian Development Bank, alongside private-sector blended finance instruments, will be critical to scale up investment in large-scale renewable infrastructure and off-grid solutions [7, p. 1]. Fourth, energy efficiency must be prioritized as a parallel strategy. The Energy Efficiency Law, adopted in 2021, provides a framework for conducting mandatory energy audits, establishing efficiency standards for buildings and appliances, and promoting demand-side management. Expanding the scope and enforcement of this law could reduce energy waste and complement renewable integration [2, p. 28].

Finally, Azerbaijan must invest in building local technical capacity and fostering public awareness. Skills development programs in universities and vocational institutions should focus on renewable technologies, system integration, and green entrepreneurship. At the same time, public awareness campaigns can improve social acceptance of renewable projects, particularly in rural communities where land-use conflicts and aesthetic concerns may arise [3, p. 3]. These actions, taken together, can enable Azerbaijan to unlock its renewable potential and move toward a low-carbon, inclusive, and resilient energy future.

Conclusion

Azerbaijan currently stands at a pivotal crossroads in its development trajectory. On one path lies continued dependence on hydrocarbons, a model that, while historically lucrative, increasingly exposes the nation to significant economic and environmental vulnerabilities. Volatility in global oil prices, declining fossil fuel demand driven by international climate commitments, and rising carbon emissions threaten to undermine long-term stability and sustainability. On the other path, Azerbaijan has the opportunity to transition toward an alternative energy economy—one that promotes diversified, innovation-driven growth, strengthens resilience to climate-related shocks, and aligns with the United Nations Sustainable Development Goals (SDGs), particularly in areas such as clean energy (SDG 7), climate action (SDG 13), and sustainable industrialization (SDG 9).

The country has made commendable progress in establishing the strategic and legal foundations for this shift. Key national frameworks such as the "Azerbaijan 2030: National Priorities for Socio-Economic Development," sector-specific reforms, and the adoption of renewable energy legislation provide a roadmap for structural transformation. However, the success of these initiatives will ultimately hinge on the quality of their implementation. Realizing the promise of a green energy future requires a comprehensive policy ecosystem that includes well-designed market incentives, regulatory certainty, transparent governance, and robust enforcement mechanisms. Additionally, attracting international finance—both concessional and private—will be essential to bridging the investment gap in renewable infrastructure and supporting innovative financing models such as green bonds, sustainability-linked loans, and public-private partnerships.

Moreover, Azerbaijan must adopt an inclusive and integrated approach to ensure that the benefits of the energy transition are broadly shared across society. This includes fostering local content development, supporting workforce retraining, promoting gender equality in the energy sector, and ensuring equitable access to clean energy services. By strategically mobilizing its abundant renewable energy resources—ranging from solar and wind to geothermal and biomass—and embedding them within its broader national development framework, Azerbaijan is well-positioned to become a regional model for a just, inclusive, and prosperous energy transition. This would not only enhance the country's global standing but also secure a more sustainable and resilient future for its citizens and future generations.

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СТРАТЕГИЯ УСТОЙЧИВОГО РАЗВИТИЯ В АЗЕРБАЙДЖАНЕ: АЛЬТЕРНАТИВНАЯ ЭНЕРГЕТИЧЕСКАЯ ЭКОНОМИКА

РЕЗЮМЕ

Устойчивое развитие в Азербайджане требует стратегического поворота от углеводородной зависимости к альтернативной энергетической экономике. В этой статье рассматриваются глобальные определения устойчивого развития, излагаются политические рамки и стратегические документы Азербайджана (в частности, его Стратегия социально-экономического развития на 2022–2026 годы), а также оценивается потенциал солнечных, ветровых, гидро-, биомассовых и геотермальных ресурсов. Хотя законодательство, такое как Закон 2021 года об использовании возобновляемых источников энергии в производстве электроэнергии, и законы об энергоэффективности обеспечивают прочную основу, возобновляемые источники энергии остаются недостаточно используемыми. Институциональные барьеры, низкая вовлеченность частного сектора и унаследованные субсидии еще больше тормозят прогресс. Опираясь на передовой международный опыт и национальные приоритеты ЦУР, мы предлагаем меры по совершенствованию рыночных механизмов, оптимизации тарифов на электроэнергию и привлечению инвестиций, обеспечивая при этом справедливый доступ и наращивание потенциала. Надежная альтернативная энергетическая экономика может сократить выбросы парниковых газов, укрепить энергетическую безопасность и поддержать обязательства Азербайджана по ЦУР до 2030 года.

Ключевые слова: *устойчивое развитие, альтернативная энергетика, возобновляемая энергетика, Азербайджан, энергетическая стратегия.*

AZƏRBAYCANIN DAVAMLI İNKİŞAF STRATEGİYASI: ALTERNATİV ENERJİ İQTİSADİYYATI

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XÜLASƏ

Azərbaycanda dayanıqlı inkişaf karbohidrogen asılılığından alternativ enerji iqtisadiyyatına doğru strateji dönüş tələb edir. Bu məqalədə dayanıqlı inkişafın qlobal tərifləri araşdırılır, Azərbaycanın siyasət çərçivəsi və strateji sənədləri (xüsusən 2022-2026-cı illər üçün Sosial və İqtisadi İnkişaf Strategiyası) təsvir edilir və günəş, külək, hidro, biokütlə və geotermal resursların potensialı qiymətləndirilir. Elektrik Enerjisi İstehsalında Bərpa Olunan Enerji Mənbələrinin İstifadəsi haqqında 2021-ci il Qanunu və enerji səmərəliliyi qanunları kimi qanunvericilik möhkəm zəmin yaratsa da, bərpa olunan enerji mənbələrindən kifayət qədər istifadə olunmur. İnstitusional maneələr, özəl sektorun aşağı iştirakı və irsi subsidiyalar irəliləyişə daha da mane olur. Bu məqalədə ən yaxşı beynəlxalq təcrübələrə

və milli DİM prioritetlərinə əsaslanaraq potensialın yaradılmasını təmin etməklə yanaşı, bazar mexanizmlərini təkmilləşdirmək, əlavə tarifləri optimallaşdırmaq və investisiya cəlb etmək üçün tədbirlər təklif araşıdırlır. Güclü alternativ enerji iqtisadiyyatı istixana qazı emissiyalarını azalda, enerji təhlükəsizliyini gücləndirə və Azərbaycanın 2030-cu ilədək DİM üzrə öhdəliklərini dəstəkləyə bilər.

Açar sözlər: *davamlı inkişaf, alternativ enerji, bərpa olunan enerji, Azərbaycan, enerji strategiyası.*

SUMMARY

Sustainable development in Azerbaijan requires a strategic pivot from hydrocarbon dependency toward an alternative energy economy. This article examines global definitions of sustainable development, outlines Azerbaijan's policy framework and strategic documents (notably its 2022–2026 Social and Economic Development Strategy), and evaluates the potential of solar, wind, hydro, biomass, and geothermal resources. Although legislation—such as the 2021 Law on Using Renewable Energy Sources in Electricity Production—and energy-efficiency laws provide a solid foundation, renewables remain under-exploited. Institutional barriers, low private-sector engagement, and legacy subsidies further hinder progress. Drawing on international best practices and national SDG priorities, we propose measures to enhance market mechanisms, optimize feed-in tariffs, and attract investment, while ensuring equitable access and capacity building. A robust alternative-energy economy can reduce GHG emissions, strengthen energy security, and support Azerbaijan's 2030 SDG commitments.

Keywords: *sustainable development, alternative energy, renewable energy, Azerbaijan, energy strategy*