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Implementation of the Green Economy in Azerbaijan

Abstract
This paper explores how Azerbaijan has adopted and applied the principles of a green economy as one of the central drivers of modern global economic transformation. Within the framework of accelerating green development, it evaluates future projections for the oil and gas sector between 2010 and 2040. The analysis focuses on distinguishing long-term and short-term trends influenced by external and internal factors that shape the industry's evolution. Moreover, the paper investigates the strategic directions available for the petroleum sector in a period when green transformation becomes a national priority. The primary aim is to determine integrated strategic models and policies that can promote an efficient and sustainable transition toward a green economy in Azerbaijan, a country where hydrocarbons still play a major role. A SWOT analysis was employed to examine the sector's strengths, weaknesses, opportunities, and threats. Concepts of green growth, the green economy, and sustainable development models were discussed comprehensively. The research drew on relevant academic sources and official documents. It concludes that all sectors, particularly energy should align with green economy standards to guarantee sustainable development and continuity in this direction. Consequently, the integrated framework of green growth and sustainable development provides promising prospects for Azerbaijan's future progress.
Keywords: Sustainable Development, Economic Transformation, Green Economy, Diversification, Green Growth.

Introduction

Although human needs are unlimited, natural resources are finite. Economics, as a discipline, seeks ways to satisfy growing needs with limited means. As the pace of economic development accelerates, pressure on resources also intensifies. Therefore, economies worldwide are being forced to adapt in harmony with nature to maintain balance. The concept of the green economy has consequently emerged as a global necessity rather than an option, as it represents the only viable path toward sustainable growth. Ignoring this shift risks triggering an ecological crisis capable of causing irreversible damage to the environment. The idea of a green economy has gained prominence as societies search for development strategies that ensure environmental protection alongside economic advancement. Countries rich in natural resources and energy potential have begun implementing targeted policies to enhance energy security, protect their ecosystems, and support economic diversification through the adoption of green economy principles. In Azerbaijan, this direction is aligned with the national strategic vision outlined in "Azerbaijan 2030: National Priorities for Socio-Economic Development", approved by Presidential Order No. 2469 (February 2, 2021). One of the five national priorities highlights the goal of transforming Azerbaijan into a nation characterized by a clean environment and green growth. This framework calls for the efficient use of energy and water resources, prevention of resource depletion, expansion of renewable energy, and minimization of air, water, and soil pollution (Orders of the President of the Republic of Azerbaijan, 2021). At international level,

Azerbaijan reaffirmed its commitment at the COP 26 Climate Conference in Glasgow (2021), pledging to cut greenhouse-gas emissions by 40 percent and to establish "net-zero-emission zones" in the liberated territories by 2050. Furthermore, during preparations for COP 29, to be hosted in Baku, President Ilham Aliyev emphasized that Azerbaijan's modern energy strategy is centered on developing renewable energy and ensuring its efficient transmission to global markets (BBC Azerbaijan). National policies now focus on expanding renewable capacity and improving energy efficiency. For example, the Karabakh and East Zangezur regions, which possess solar potential exceeding 7,000 megawatts and wind potential around 2,000 megawatts, are designated as green-energy zones (Gasimli, V. A, 2022, p.180). These initiatives demonstrate Azerbaijan's firm dedication to aligning its economic model with sustainable and environmentally responsible growth.

Transition from Brown to Green Economy

The global economy has traditionally been shaped by the brown economic model, which relied heavily on fossil fuels and intensive use of natural resources (Ministry of Energy of the Republic of Azerbaijan). This model supported industrial expansion for more than a century but also caused deep environmental and climatic consequences, including greenhouse gas accumulation and ecological degradation (Orders of the President of the Republic of Azerbaijan, 2021). In the 21st century, a paradigm shift toward a green economy has become essential to ensure sustainable growth and environmental balance (SOCAR).

For Azerbaijan, the concept of the green economy is especially relevant, given its long history as one of the world's earliest oil-producing nations. The country's petroleum industry began developing in the second half of the 19th century, when Baku became a major global oil center. By the early 20th century, Azerbaijan accounted for over half of the world's oil production, contributing significantly to industrialization and economic growth (New Azerbaijan Party). During the Soviet era, Azerbaijan remained a vital supplier of crude oil and petrochemical products to the Union's energy system (BBC Azerbaijan). After gaining independence in 1991, the oil and gas sector continued to play a central role in the national economy. The signing of the "Contract of the Century" in 1994 marked a turning point, attracting foreign investment and transforming Azerbaijan into a major exporter of crude oil and natural gas (Customs Committee of Azerbaijan). These developments provided strong economic growth but also reinforced structural dependence on fossil fuels.

In recent decades, however, the need to transition from a brown to a green economy has gained momentum. The Government of Azerbaijan has recognized that reliance on oil revenues alone poses both environmental and economic risks. Therefore, diversification through renewable energy, efficient resource management, and low-carbon technologies has become a strategic goal (Ahmad, T., 2020, p. 1975). Achievement of the transformation in Azerabijan means balancing continued energy production with responsible environmental stewardship. The country's vast potential in solar, wind, and hydro resources provides opportunities to create a resilient, diversified, and sustainable economic system (D'Amato, D., 2021, p. 107-143). Consequently, the transition from a brown to a green economy in Azerbaijan is not merely a technological transformation but also a profound economic and social evolution toward a sustainable future (Gaisina, LM, 2022, p. 106-113).

Green Economy in Global Power Centers

The emergence of a green economy demonstrates clear geographical disparities among leading global economies. Europe has historically functioned as a central region for green economic initiatives, primarily depending on energy imports to satisfy its demand. In contrast, the United

States and China, two of the largest economies and major consumers of oil and gas, are actively advancing policies to foster green economic development. Unlike Europe, these nations

are pursuing a more balanced and sustainable approach. Both the US and China offer substantial support for scientific and technological projects in the green energy sector and provide strong incentives for industrial enterprises that develop innovative environmental solutions (Gaisina, LM, 2022, p. 106-113) Simultaneously, these countries impose relatively fewer restrictions on traditional oil and gas activities compared to Europe, and domestic and foreign energy companies face less regulatory burden (Gaisina, LM, 2022, p. 106-113).

The Impact of the Green Economy on the Oil and Gas Sector

In evaluating the influence of the green economy on the oil and gas sector, it is important to note that the countries considered are not only major exporters of oil and gas products but also substantial global consumers. This group includes nations such as Azerbaijan, Russia, Brazil, Nigeria, among others, all of which possess significant hydrocarbon reserves. These countries demonstrate varying approaches regarding the interaction between green energy initiatives and the traditional oil and gas sector. A detailed analysis was carried out for each of these country groups, and the results are summarized in Table 1.

Classification			
	Country group	**The position of the fuel and energy company**	**Represented countries**
1	Countries that actively promote the green economy	1) Imposition of regulatory constraints on oil and gas industry stakeholders; 2) Differentiated treatment of oil and gas firms in public procurement; 3) Macroeconomic planning neglecting international oil and gas potential	The countries of the European Union, particularly the Scandinavian nations (excluding Norway), as well as Germany, France, the Benelux states, and the newer member states of the EU
2	Countries exhibiting a moderate level of support for the green economy	1) Strategic planning for gradual decline of oil and gas in the national energy balance; 2) Substantial state support for green research and implementation; 3) Minimal restrictions on oil and gas with opportunities for green alternatives	1) Countries with extensive oil and gas reserves and advanced full-cycle industry; 2) Emerging industrial hubs and oil and gas importers
3	Oil and gas exporting countries	1) Absence of independent initiatives for green-oriented energy market restructuring; 2) Conditional support for green projects based on long-term profitability; 3) Strategic energy sector planning considering global trends and key partners	1) OPEC member states; 2) Major oil-producing countries outside OPEC; 3) Countries with large oil reserves but limited domestic industrial demand.

Table 1. Classification of the Extent to Which Energy Resources Are Replaced by Green Alternatives in the Oil and Gas Market

Source. *(Ahmad, T., 2020, p. 1973-1991; D'Amato, 2021, p. 107-143)*

Within the context of green economy formation, the first group of countries is most extensively documented regarding the evolution of the oil and gas sector. The transformations observed in the oil and gas markets of the second and third groups of countries are expected to follow similar patterns as the first group, albeit with a temporal delay. For the second group, this lag is estimated at approximately 8-12 years, while for the third group it ranges from 10 to 15 years (Gromova, E. 2020, p. 461-467). Assuming that the European Union achieves its targeted green economy development indicators, the restructuring processes of the oil and gas market are projected to reach their final stage by 2040 (Gaisina, LM, 2022, p. 106-113)

In the first group of countries, the main obstacles to the advancement of a green economy which simultaneously sustain stable demand for oil and gas products include the following

factors (Table 1):

- Limited availability of green resources and restrictions on the expansion of green technologies;
- Lower logistical accessibility of renewable energy carriers compared to the well-established logistics of oil and gas distribution;
- Intensifying competitive pressure on European companies, the leaders of the green economy, from major oil and gas-consuming countries, notably China and the United States;
- Legal and logistical constraints that prevent breaches of long-term contracts for oil and gas supply to countries transitioning toward a green economy;
- Potential competition from emerging technologies, particularly dual-component nuclear energy projects, which may rival green energy initiatives (Litvinenko, IL, 2021, p. 220-224; Litvinenko, IL, 2021, p. 225-230).

Table 2 illustrates the energy potential of a green economy in terms of the substitution of oil and gas products with renewable alternatives.

Dynamics and forecast				
	2010	**2020**	**2030 (P)**	**2040 (P)**
Total energy consumption by source (million tons equivalent)	10.5	11.4	12.4	13.3
Biomass	1,313.0	1,791.0	2,483.0	3,271.0
Large-scale hydropower	266.0	309.0	341.0	358.0
Geothermal energy	86.0	186.0	333.0	493.0
Small-scale hydropower	19.0	49.0	106.0	189.0
Wind energy	44.0	266.0	542.0	688.0
Solar thermal energy	15.0	66.0	244.0	480.0
Photovoltaic energy	2.0	24.0	221.0	784.0
Solar thermal electricity	0.4	3.0	16.0	68.0
Marine energy	0.1	0.4	3.0	20.0
Total	**1,745.5**	**2,964.4**	**4,289.0**	**6,351.0**

Table 2. Forecast of Global Energy Demand by Source Until 2040

Source. (Kumar M., 2020, p. 2)

There is a pressing global economic necessity to develop alternatives to the oil and gas sector, particularly with respect to substituting hydrocarbons. Experience from European Union countries, regarded as leaders in establishing a green economy, demonstrates that the immediate replacement of conventional hydrocarbon resources with environmentally sustainable alternatives is not feasible (Revel-Muroz, P. A., 2017, p. 49–55). Considering the outcomes of the European Commission's experiment in directive-based economic restructuring according to green principles, a SWOT analysis was carried out to assess the strengths, weaknesses, opportunities, and threats of the oil and gas sector as a key participant in the global energy market for the period 2022–2030 (Table 3)

Table 3. SWOT Analysis of the Oil and Gas Sector in the Context of Green Economy

SWOT analysis	
Strengths	**Weaknesses**
1) The existence of long-term contracts for international trade in oil and gas products; 2) The impossibility of the transition of the economies of the world to green energy sources without significant adaptation of infrastructure and production processes; 3) The presence of alternative buyers for green western economies in the face of growing eastern markets and their own markets of oil-exporting countries; 4) The lack of green energy opportunities to completely replace hydrocarbon energy sources; 5) The dependence of the green economy on state support	1) Negative attitude of consumers with great power towards the energy potential of the oil and gas sector; 2) Depletion of oil and gas industry resources; 3) Asymmetry of the geographical location of oil and gas industry resources, the desire of the most developed economies not to depend on oil and gas exporting countries; 4) Environmental attractiveness of green energy, its higher social responsibility than the oil and gas sector; 5) Significant state support for green energy by the world's leading economies
Opportunities	**Dangers**
1) The potential to redirect oil and gas flows to countries with the least environmental constraints; 2) The potential to expand gas exports as an ecological alternative to oil; 3) The opportunity to earn extra profits from the sale of oil and gas in the context of the depletion of world hydrocarbon reserves; 4) The opportunity to earn extra profits from the sale of oil and gas in the context of setting limits on the use of hydrocarbons by green economies; 5) The opportunity to increase the environmental friendliness of the oil and gas industry through the implementation of innovative initiatives in the oil and gas sector	1) The expected decline in the use of oil and gas resources in the long term; 2) Risks of pressure from green economies in the form of restrictions on the import of oil and gas products by countries using the products of the oil and gas sector; 3) Risks of depletion of the resource potential of the hydrocarbon economy; 4) Threats associated with the logistical complexity of redistributing oil and gas flows in the event that major countries that are importers of oil and gas products refuse to import a significant part of previously imported oil and gas; 5) Risks associated with the resumption of price wars between leading exporters of oil and gas products

Development

Source. *(Gorokhova, AE, 2018, p. 103-108; Sekerin, VD, 2018, p. 68-72)*

The SWOT analysis indicates that the strengths and opportunities of the oil and gas sector are primarily linked to the current impossibility of fully substituting oil and gas with disposable green alternatives. This provides exporters with sufficient time to optimize technological and logistical processes, thereby mitigating potential negative impacts of the green economy transition. Conversely, weaknesses and threats arise from potential uncoordinated actions among industry stakeholders, a focus on short-term profits, and technological stagnation within the sector (Gorokhova, AE, 2018, p. 103-108; Sekerin, VD, 2018, p. 68-72).

Green Growth

In 2009, in response to the global financial crisis, South Korea adopted the National Strategy for Green Growth along with a Five-Year Plan, establishing itself as a global promoter of green development, primarily via the OECD platform. At the OECD Ministerial Council meeting in June 2009, 30 member countries and five candidate countries, representing approximately 80% of global economic capacity, endorsed the principle that environmental protection and economic growth can coexist. Work commenced on a green growth strategy to comprehensively integrate economic, environmental, social, and technological considerations (UNESCAP, 2012).

The OECD currently leads the implementation of green growth, with additional support from institutions such as the World Bank, Green Growth Leaders, and various think tanks. The Green Growth Strategy, first presented in the 2011 OECD forum, is designed to foster economic

dynamism, create green jobs, improve energy and material efficiency, and properly value environmental services. Its objectives include establishing national accounting frameworks that account for environmental and social factors, providing tools and recommendations for national policies, supporting developing economies, and promoting both short and long-term employment opportunities (Prague Economic Papers, 2017, p. 489).

National green development strategies are critical because social and economic activities impact ecosystems, creating imbalances that threaten economic growth. Natural capital, including mineral resources, is often undervalued, leading to inefficiencies and reduced societal well-being. The absence of coherent strategies can discourage investment and innovation, slowing sustainable development. Overall, these strategies aim to encourage environmentally responsible behavior among businesses and consumers, ensure equitable redistribution of jobs, capital, and technology, and provide incentives for ecological innovation (Prague Economic Papers, 2017, p. 490).

Green Growth, Green Economy, and Sustainable Development

Although green growth and the green economy are often considered subcategories or indicators of sustainable development, they should be distinguished. Green growth and the green economy do not replace sustainable development but serve as practical frameworks to achieve it. Implementing a green growth strategy allows measurable progress in economic and environmental terms by:

- Improving resource and energy efficiency while reducing waste;
- Stimulating innovation to address environmental challenges;
- Creating new markets and employment through demand for green technologies and services;
- Increasing investor confidence by ensuring predictable and stable government action;
- Supporting stable macroeconomic conditions, reducing volatility in resource prices, and promoting fiscal consolidation (OECD, 2012).

The green economy focuses on identifying all sectors that can be “green” including natural capital-dependent sectors such as agriculture, fisheries, forestry, and water management, as well as transport, energy, and manufacturing. Resource efficiency not only reduces environmental pressure but also enhances economic growth and employment. Economically, green growth increases overall welfare; socially, it improves quality of life; and ecologically, it optimizes the use of natural capital (Prague Economic Papers, 2017, p. 495).

Conclusion

The transition to a green economy will gradually reduce global demand for oil and gas products. Nevertheless, the oil and gas sector has an adaptation window of at least ten years. Coordinated efforts among market participants, avoiding price wars, can lead to revenue growth. Technological innovations will further stabilize the position of oil and gas suppliers in the long term.

The integration of green growth, green economy, and sustainable development forms a strategic development model that promotes rapid social prosperity within an ecologically sustainable framework. Resource conservation and optimized utilization are among the most effective and low-cost strategies for startups, providing both immediate and long-term benefits.

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