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## **Evaluation of the use of Alternative Energy Sources (NPP) in Agroecotourism as a Stage of Our Republic's Transition to a "Green Economy"**

### **Abstract**

The COVID-19 pandemic and its aftermath have demonstrated that natural factors, beyond macro- and microeconomic indicators, have no place in modern economic development. Simply put, human nature is the bridge that connects free decisions, financial outcomes, and social events. This complements the integrity of the economy, making its development sustainable. In this context, this article examines both alternative energy sources in a broad sense and their application in agroecotourism within the context of sustainable development.

**Keywords:** *alternative energy sources, sustainable development, sustainable tourism, agricultural ecotourism, and green economy*

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## Respublikamızın “Yaşıl İqtisadiyyat”a keçidinin bir mərhələsi kimi aqrøkoturizmdə alternativ enerji mənbələrinin (AES) istifadəsinin qiymətləndirilməsi

### Xülasə

COVID-19 pandemiyası və onun sonrakı təsirləri göstərdi ki, makro və mikroiqtisadi göstəricilərlə yanaşı, təbii amillər müasir iqtisadi inkişafda mühüm yer tutur. Sadə şəkildə desək, insan təbiəti azad qərarları, maliyyə nəticələrini və sosial hadisələri bir-biri ilə əlaqələndirən körpüdür. Bu işə iqtisadiyyatın bütövlüyünü tamamlayaraq onun inkişafını dayanıqlı edir. Bu kontekstdə məqalədə alternativ enerji mənbələri geniş şəkildə, eləcə də onların davamlı inkişaf çərçivəsində aqrøkoturizmdə tətbiqi araşdırılır.

**Açar sözlər:** *alternativ enerji mənbələri, davamlı inkişaf, davamlı turizm, aqrøkoturizm, yaşıl iqtisadiyyat*

### Introduction

Historically, economic development has been closely correlated with rising energy consumption and increasing greenhouse gas (GHG) emissions. Renewable energy can help break this correlation, promoting sustainable development. While the precise contribution of renewable energy to sustainable development must be assessed in the context of each country, renewable energy offers opportunities to support socio-economic development, expand access to energy, ensure a reliable energy supply, mitigate climate change, and reduce negative environmental and health impacts. Access to modern energy services will contribute to achieving the Millennium Development Goals (REN21, 2024).

Our planet offers a diverse range of renewable energy sources, enabling humanity to meet its needs with minimal environmental impact. Despite the increasing adoption of alternative energy sources, the transition from traditional to conventional energy sources is slow—that is, not fast enough—due to implementation costs and the interests of various political and economic actors. (International Energy Agency, Key World Energy Statistics, 2024).

### Literature Review

#### Alternative Energy Sources

There are alternative energy sources to traditional forms of energy, such as those derived from fossil fuels. For this reason, they are often referred to as "alternative energy" or "alternative energy sources." Currently, there is no uniform definition of these types of energy. Therefore, in many cases, alternative energy refers to sustainable energy sources, while in other cases, the term refers to sources

that do not rely on the combustion of fossil fuels (International Energy Agency, World Energy Investment, 2024):

There are different forms of energy, and surprisingly, they can be converted into each other.

Let us look at a few examples:

- The sun radiates a tremendous amount of energy into space, which we perceive as light and heat. When sunlight strikes a substance, such as the molecules that make up water, those molecules begin to move, releasing heat—a form of energy.

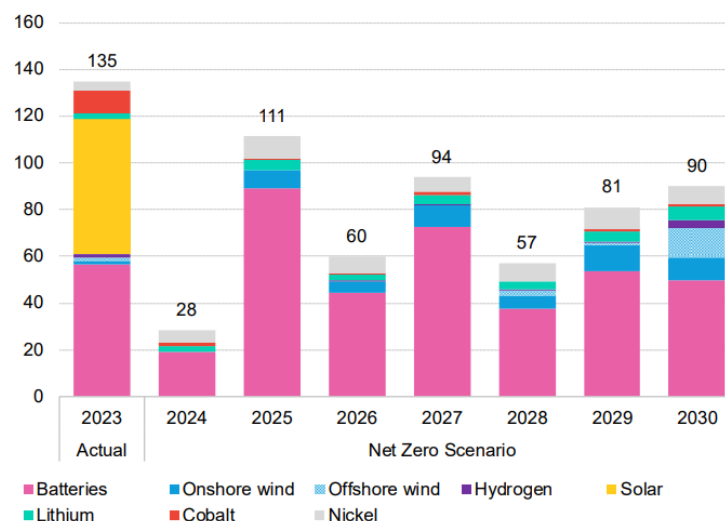
- When you turn on a lamp, the electrical energy supplied through the outlet is converted into light and heat energy.

- The chemical energy of fossil fuels is converted into mechanical energy through combustion in an engine that powers a vehicle.

Alternative energy sources are methods of generating energy that differ from traditional sources. This type of energy offers significant advantages: it is non-polluting, renewable (inexhaustible), and uses clean, naturally occurring resources. Examples of such energy sources include solar, wind, and hydroelectric power, which are environmentally friendly and produce no waste.

The use of modern energy sources, such as oil, natural gas, and coal, brings with it problems, including pollution and increased greenhouse gas emissions. The debate over "alternative" and "traditional" energy represents a shift that will inevitably occur in the near future. It is important to emphasize that alternative energy sources, even renewable ones, are also limited and, like any other natural resource, have their limits. Therefore, even if we transition to these new energy sources gradually, it will not allow us to continue with the current economic model based on constant growth. This is precisely why the concept of sustainable development emerged (Table 1).

**Table 1**  
 Clean-tech supply chain investment, actual 2023 and Net Zero Scenario to 2030 \$ billion (real 2023)



Bloomberg New Energy Finance, Global Trends in Renewable Energy Investment 2024

Currently, Azerbaijan's total power generation capacity is 8320.8 MW, and the capacity of power plants using renewable energy sources, including large hydroelectric power plants, is 1687.8 MW, which is 20.3% of the total capacity. The main goal is to increase this figure to at least 30% by 2030 (Table 2).

**Table 2**  
 Cost of Alternative Energy Projects in Azerbaijan (AZPROMO).

<b>Project name</b>	<b>Project cost</b>
<b>Lokbatan Wind Power Station</b>	74.4 mln. manat
<b>Khizi-3 Wind Power Station</b>	377.7 mln. Manat
<b>Khizi-2 HEPP</b>	193 mln. Manat
<b>Absheron Hybrid Station</b>	154.4 mln. Manat
<b>Hybrid electric and thermal power plant</b>	96.3 mln. Dollar
<b>Samukh Agroenergy Residential Complex</b>	165 mln. Dollar
<b>Wind Island-1</b>	408.9 mln. Dollar
<b>PV Siyazan Solar Station</b>	60 mln. Dollar
<b>Pirallahi Wind Power Station</b>	800 mln dollar
<b>Samukh-Agroenergy Project</b>	150 mln dollar

## **Methods and materials**

### **1. Sustainable Development and Sustainable Tourism**

When it comes to sustainability, the first thing that comes to mind is environmental protection. The three main components of sustainability—environmental protection, economic growth, and social development—must be managed in a balanced manner.

Sustainability is the use of resources without depleting them and ensuring their sustainability (Fleischer, et al., 2018).

According to the UNWTO definition, sustainable tourism not only meets the needs of tourists and local communities but also contributes to the preservation and expansion of opportunities for future development. While using resources to meet economic, social, and aesthetic needs, it is also necessary to consider the preservation of cultural integrity, essential ecological processes, biodiversity, and existing systems as sources of life ([www.unwto.org/content](http://www.unwto.org/content)). Of course, such a broad definition risks limiting the term's scope. Therefore, the concept of sustainable tourism can only fully realize its potential if the following prerequisites and characteristics are taken into account. Sustainable tourism is a concept that is gaining increasing importance among tourism industry stakeholders seeking to counter the perceived negative impacts of globalization (Garda, & Temizel, 2016).

The natural, cultural, social, architectural, and other attractions of regions attract tourists. The primary objective of sustainable tourism is to meet tourists' needs, ensure the successful completion of their trips, and transmit the values underlying tourism to future generations without compromising them. In this way, tourism values will be preserved, and the region's sustainable tourism potential will be ensured.

Sustainable tourism is the only way to conserve natural, ecological, biological, and sociocultural resources, minimize losses, and increase future tourism activity and revenues (United Nations Sustainable Development Solutions Network, 2020).

Sustainable tourism:

- Creates offerings for all types of tourism – both niche and mass tourism;
- Monitors a broader perspective encompassing all stakeholder groups in the destination, while also considering indirect impacts;
- Recognizes the need for support from political and institutional bodies that provide the fundamental conditions and strategies for long-term development;
- Develops as a process aimed at optimizing the destination's initial position in the sector.
- Implements and develops continuous situation assessments and appropriate monitoring mechanisms to maintain awareness of the current situation;
- It is linked to customer satisfaction and seeks to raise awareness of a higher quality of life.

Developing sustainable tourism requires a holistic approach encompassing the three dimensions of sustainability: economic, environmental, and social. These three dimensions are complemented by

an overall strategic management approach as the core institutional dimension. (<https://www.untourism.int/standards/measuring-sustainability-tourism>).

In the process of tourism development in the region, investments in tourism can also play an essential role in the development of tourist facilities (destinations) without harming the environment or the socio-cultural sphere. In destinations with intensive tourism, the concept of sustainable tourism is of great importance to ensure the sustainability and development of tourist attractions within the broader environment, as well as to improve visitor satisfaction, market position, and destination popularity.

Sustainable tourism is a positive approach that aims to minimize tensions and conflicts arising from the complex relationships among the tourism industry, visitors, the environment, and the communities visited. Thus, it aims to improve the quality of both natural and human resources and ensure their long-term survival. It is consistent with growth theory, but emphasizes that growth has its limits. These limits will vary by region and the experience of the governing bodies. This approach aims to support tourism development in the area while simultaneously increasing visitor satisfaction (United Nations Sustainable Development Solutions Network, 2020).

Sustainable tourism – considering existing and future economic, social, and environmental impacts- meets the needs of visitors, the tourism sector, the environment, and host communities. The objectives of sustainable tourism can be summarized as follows:

- Develop a high level of awareness and understanding of tourism's contribution to the environment and the economy.
- Minimize air, water, and soil pollution, as well as waste generation by tourism businesses and visitors.
  - Promote equitable development.
  - Improve the quality of life of the host community.
  - Increase employment in the host community.
  - Respect and develop the historical heritage, distinctive culture, traditions, and customs, as well as the unique characteristics of host communities.
  - Sustainably offer high-quality products.
  - Preserve the essence of the tourism workforce and host community.
  - Offer visitors a high-quality experience.
  - Preserve and protect historical, cultural, aesthetic values, and natural resources, and maintain and enhance environmental quality for future generations.
- Plan and manage tourism development in a manner that does not lead to environmental and socio-cultural problems in tourism destinations.
- Involve and strengthen local communities in planning and decision-making processes related to tourism management in their regions and their future development, in collaboration with other stakeholders (United Nations Tourism, n.d.-b).

The main goals of sustainable tourism are to preserve the economic, environmental, social, and cultural values that underpin tourism, ensure a balanced use of these values, and create conditions for future generations to engage in tourism activities in a supportive environment.

We must not forget that sustainable development is achieved with the participation of local communities.

Sustainable tourism encompasses 12 of the 17 Sustainable Development Goals (United Nations Tourism, n.d.-b).

The goal of developing sustainable tourism strategies for a given destination is to increase tourist numbers while adhering to sustainable development principles. The primary goals of sustainable tourism are economic development and the preservation and, where possible, enhancement of environmental values through tourism activities. Furthermore, the United Nations Environment Programme (UNEP) has defined 12 goals of sustainable tourism as follows:

1. Economic Sustainability: Ensuring the sustainability and competitiveness of tourism destinations and enterprises to ensure continued long-term benefit and growth.

2. Local Prosperity: Maximizing the contribution of tourism to the host destination, including increasing the share of domestic visitor expenditure.

3. Quality of Employment: Increase the quantity and quality of jobs created by tourism by raising wages and providing services without discrimination based on race, gender, or disability.

4. Social Equity: Ensure the equitable distribution of the economic and social benefits of tourism, including improving opportunities, incomes, and services for people experiencing poverty.

5. Visitor Satisfaction: Ensuring a safe and satisfying experience for all visitors without discrimination based on race, gender, or disability.

6. Local Control: Engaging local governments in tourism planning, management, and development through consultation with other tourism stakeholders and strengthening their capacity to plan, manage, and develop tourism in the region.

7. Social Welfare: Maintaining and improving the social fabric and quality of life of local populations, including access to resources, infrastructure, and livelihoods, without compromising social stability or exploitation.

8. Cultural Wealth: Respecting and promoting the culture, traditions, and historical heritage of host communities.

9. Physical Integrity: Maintaining and enhancing the quality of urban and rural areas, preventing physical and visual deterioration of the environment.

10. Biodiversity: Supporting the conservation of natural areas, habitats, and wildlife, and minimizing potential damage.

11. Resource Efficiency: Minimizing the use of limited and non-renewable resources in the development or operation of tourism facilities and services.

12. Environmental Cleanliness: Minimizing air, water, and soil pollution, as well as waste, generated by tourism facilities or visitors (United Nations Tourism, n.d.-b).

The principles of sustainable development promote the environmental, economic, and socio-cultural development of tourism. To ensure the long-term sustainability of tourism, it is necessary to achieve an appropriate balance between these three aspects. Innovation and knowledge development in the tourism sector significantly impact the implementation of these principles.

General principles of sustainable tourism:

- Principles of public benefit: informing local communities about the advantages and benefits of tourism, educating local communities on environmental protection issues, and ensuring their benefits to society.

- Principle of extending the tourist season: minimizing potential negative impacts by distributing tourism across different locations and time intervals (12-month tourism).

- Principle of tourism investment: ensuring flexibility, openness to development, and long-term investment in tourism.

- Principle of planning: planning and management for the controlled development and sustainability of tourism in the region.

- Principle of naturalness: developing tourism in accordance with the natural appearance of the environment.

- Principle of economic development: supporting the improvement and protection of the environment while strengthening the local economy.

- Sustainability principle: ensuring the provision of natural, cultural, and other resources for the use of future generations.

- Local ecosystem principle: attention to the aesthetic features of the environment, natural life, and local culture.

- Satisfaction principle: ensuring the satisfaction of tourists and residents.

- Participation principle: involving residents and other stakeholders in decision-making processes (United Nations Tourism, n.d.-b).

The principles of sustainable tourism play an important role in increasing residents' contributions to it. Therefore, the importance of residents' participation in sustainable tourism planning, decision-making, and action is emphasized.

The United Nations Environment Programme has published four core principles to promote sustainable tourism. They are as follows:

1. The principle of social sustainability ensures the development of society in accordance with traditional values and promotes the strengthening of social identity.

2. The principle of environmental sustainability improves the development of vital ecological processes in accordance with biodiversity and biological resources. It aims to promote the concept of responsible tourism, which minimizes air, water, soil, and environmental pollution caused by tourism enterprises and visitors. It aims to protect natural habitats and reduce environmental damage and harm to animals.

3. The principle of cultural sustainability ensures cultural development in accordance with the cultural values of human society and promotes the strengthening of its identity.

The principle of sustainable economic development ensures the management of resources so that future generations can use them at minimal financial cost. It advocates implementing policies to ensure the success of commercial enterprises in tourism destinations (United Nations Tourism, n.d.-a).

## **2. Agro-ecotourism**

The primary goal of rural ecotourism is to stay in a village, on a farm, or in a mountain lodge, to experience rural culture, socialize, and relax. Rural ecotourism typically refers to the use of rural areas by city residents, within or across countries, for leisure, recreation, and small-business activities. Indeed, there are some differences in the goals and activities. Despite being located miles from populated areas, meeting tourists' recreational needs, and easily adapting to various types of tourism and agriculture, agro-ecotourism has become a growing tourism activity in many countries (León-Gómez A. et al., 2021).

As approaches to tourism and conditions in rural areas change, agro-ecotourism has emerged, promoting rural lifestyles and their characteristics to tourists seeking to better understand local culture and way of life (Deb, S.K. et al. 2023). This can range from an extended rural vacation to a few minutes' stroll through the countryside in the afternoon. Such vacations can be linked to emotional goals, such as proximity to the city, participation in excursions, cultural or recreational activities, sports, or visiting family and relatives (Sayed Elhoushy, et al., 2025). The richness of traditional culture and the untouched natural environment of the countryside attract urban populations who prefer to spend their holidays there. Agro-ecotourism, a type of residential tourism, is presented in all its diversity. Tourists seek not only to relax but also to observe, participate, learn, and exercise. Furthermore, the village's location is unique, offering a wide range of outdoor activities. Traditional houses, streets, and village mosques are integral elements of the tourist attraction. In these areas, it is important to interact with local villagers, drink tea, eat, and take long walks.

Rural areas are typically dominated by agriculture and livestock farming, but they also host other economic activities such as tourism, small- and medium-sized industries, and handicrafts. Villages are defined as places with social and economic structures, such as markets, that have ecological value and are in constant interaction with urban areas (Roberts, et al., 2018).

Due to their location, villages integrated into the natural environment can organize a wide range of outdoor sports (mountaineering, trekking, paragliding, horseback riding, rafting, etc.). There is no need to build hotels in villages for this purpose. Rural houses are sufficient for accommodation. The presence of an office, organization, equipment, and guides provides a wide range of services. Travel through untouched natural areas to admire and explore the region's natural beauty, flora, and fauna; experience cultural activities typical of these places; and establish a direct connection with nature, observing, learning, and analyzing (Barbieri, et al., 2019).

Agricultural ecotourism is a priority area of tourism. This model, developed on the principles of sustainable development, is rapidly spreading across many developed countries. Agricultural

ecotourism is considered an important tool for both agricultural and ecotourism development. Thus, the development of agricultural ecotourism contributes to creating new jobs in the country, fostering local entrepreneurship, and preventing migration. Factors determining the distribution of tourism throughout the year and the length of the tourist season include the country's geographic conditions, tourist demand, the type of tourism, tourism policy, and global events (Tourism Teacher, n.d.).

Rural ecotourism is a type of tourism that is not 100% seasonally dependent and has no seasonal characteristics. The four-season nature of agricultural ecotourism increases the diversity of activities. Thus, tourists can enjoy eco-friendly winter sports, villagers can take long walks through the countryside in the spring, and farmers can exploit the appeal of agricultural products in the summer and autumn (Tourism Teacher, n.d.).

With changing global vacation ideas, people's move away from the sea, a vacation based on sand and sun, the rapid spread of technology and information, travelers' desire and experience to participate in various types of recreation, the desire to relieve fatigue, the concrete and population density of large cities, and the tranquility and natural environment, the development of agro-ecotourism is a priority and shows that its importance will only grow. In this context, to diversify tourism and expand it across all four seasons, it is necessary to identify agro-ecotourism areas, a type of alternative tourism that has a positive impact on the global economy, and ensure their sustainability (United Nations Sustainable Development Solutions Network, 2020).

Tourism is an economic sector shaped by the values offered by the environment. Therefore, ecology and tourism are vitally interrelated. In today's world, when environmental problems have reached alarming proportions, it is essential to develop environmental awareness. It is now recognized that tourism fosters an understanding that local resources have universal value. Sustainability is the most discussed topic in relation to tourism and ecology today. The difference between sustainable tourism and the classic understanding of tourism lies in living alongside local people in their environment, embracing their culture, and engaging with nature rather than relying on its comforts. A region's sustainability depends on the quality of the environment, the pursuit of a "balance between conservation and use" of all natural resources, and the continued preservation of all the values that attract tourists to a given destination (<https://files.unsdsn.org/2020%20Guide-to-a-sustainable-tourism-web.pdf>).

### **3. Green Economy**

Research on the green economy and sustainable development is among the most important areas of research devoted to growth, development, and progress, attracting the attention of researchers and scientists for its role in advancing all sectors of society. It is the essence and foundation of sustainable development. Carl Burkart defined the green economy as based on six core sectors (United Nations Environment Programme, n.d.):

1. Renewable energy
2. Green buildings
3. Sustainable transport
4. Water management
5. Waste management
6. Land management

A green economy is considered a viable and ideal model for sustainable development, particularly economic development that impacts all aspects of life. Its concept has emerged in recent years due to its importance in reducing hunger and poverty, improving living standards, and ensuring human well-being. It is important to remember that sustainable development can only be realized through the implementation of a green economy program and the protection of a healthy environment. This can only be achieved by replacing harmful economic instruments with beneficial ones. For example, since fuel sources pollute the environment and harm all forms of life, thermal energy can be produced from safe sources rather than fuel sources (United Nations Environment Programme, n.d.).

In the face of environmental pollution, depleting natural resources, and growing global demand, expanding the green economy is crucial to achieving sustainable development. It is no coincidence

that the fifth priority of the "Azerbaijan 2030: National Priorities of Socioeconomic Development" program, approved by President İlham Aliyev, is "Clean Environment and Green Development." The document sets specific goals for the widespread use of environmentally friendly technologies, waste recycling, and the rehabilitation of contaminated areas, as well as expanding the use of environmentally friendly "green" technologies (Ministry of Economy of the Republic of Azerbaijan, n.d.).

### **Results and discussions**

A green economy recognizes the value of people and nature, improves well-being, reduces poverty, and utilizes limited natural resources efficiently and optimally. It forms the basis for new economic concepts, such as recognizing the value of people and nature, improving well-being, reducing poverty, and utilizing limited natural resources efficiently and optimally.

The concept of sustainable development is based on the economic, political, social, and cultural well-being of the world we live in. Today, the production of all goods and services necessary for human survival is possible thanks to healthy ecosystems. Countries around the world are seeking ways to achieve sustainable development. In this context, the concept of sustainable development emerged. Its fundamental idea is to create conditions and mechanisms for the interdependence of socio-economic and environmental development, and to address environmental issues comprehensively within socio-economic processes.

The sustainable energy model is based on the following assumptions:

- Use of renewable energy sources, as currently exploited fossil fuel reserves will eventually be depleted.
- Use of clean energy sources, eliminating traditional and nuclear combustion processes.
- Widespread exploitation of energy sources, with incentives for self-consumption offered as an alternative, thereby avoiding, where possible, the construction of large-scale electricity generation and distribution infrastructure.
- Reducing energy demand by increasing the efficiency of electrical equipment (appliances, lamps, etc.).
- Reducing or eliminating unnecessary energy consumption. This is not simply about more efficient consumption, but about consuming less, which means developing an awareness and culture of energy conservation and condemning waste.

The production of clean, alternative, and renewable energy is a necessity humanity must meet in the short term; therefore, it is not a fad or trend, but an apparent necessity. The efficient use of clean energy sources (CER) in large industrial and agricultural parks, as well as multi-purpose tourism complexes, is noteworthy. Thus, large-scale enterprises play a positive role in the sustainable development of any country's economy, both by maintaining employment levels and by generating economic benefits. Unfortunately, however, in most countries, these enterprises rely on traditional energy sources. The main reason for this is the lack of awareness among their managers. Our country also faces this problem. We see the solution to this problem in the implementation of awareness-raising measures.

### **Conclusion**

This article argues that:

- Transitioning to renewables is not optional but a necessity.
- Agro-ecotourism can serve as a practical stage in this transition, linking rural development with sustainable energy use.
- Awareness campaigns are crucial, since many enterprises still rely on traditional energy due to a lack of knowledge.

"The production of clean, alternative, and renewable energy is a necessity humanity must meet in the short term; therefore, it is not a fad or trend, but an apparent necessity."

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