

ECONOMIC EFFICIENCY OF USING RENEWABLE ENERGY SOURCES IN
AGROTOURISM

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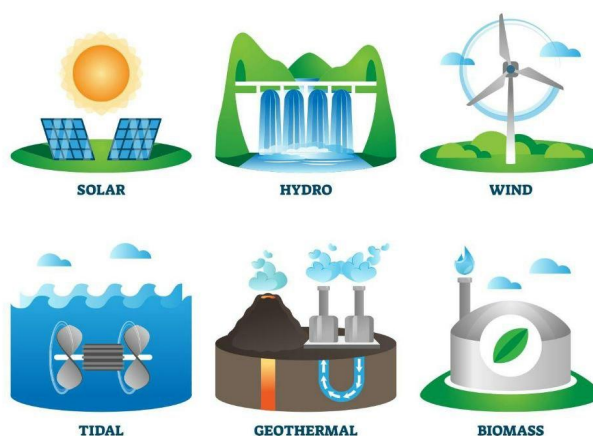
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Abstract: This article analyzes the economic aspects of increasing energy efficiency in rural areas through the use of renewable energy sources (RES) in agrotourism. The integration of RE and agrotourism is important in ensuring sustainable development in the agricultural and tourism sectors. The study analyzes the economic aspects of this integration, including factors such as reducing energy costs, creating new jobs, and developing local infrastructure. Foreign experience is also studied and the possibilities of its application in the conditions of Uzbekistan are considered.

Keywords: renewable energy, agrotourism, rural areas, energy efficiency, economic efficiency, sustainable development, foreign experience.

Introduction

In recent years, the use of renewable energy sources has become a pressing issue on a global scale. The limitations of traditional energy sources and their negative impact on the environment are increasing interest in renewable energy sources. At the same time, agrotourism plays an important role in the economic development of rural areas. The use of renewable energy sources in agrotourism creates great opportunities for increasing energy efficiency and ensuring economic stability in rural areas.



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Research and literature review

A large number of studies have been conducted on the economic efficiency of renewable energy sources and agrotourism. For example, the Resolution of the President of the Republic of Uzbekistan No. PQ-3012 dated May 26, 2017 provides for the diversification of the fuel balance through the widespread use of renewable energy resources and the replacement of traditional fuels with renewable energy sources.² There are also studies on the economic and environmental advantages of using renewable energy sources, which are considered more economical than traditional energy sources in the long term.

The German experience is considered successful in the development of renewable energy sources. Laws passed in the 1990s and 2000s required energy suppliers to purchase electricity generated from renewable energy sources. This encouraged investment in the renewable energy sector.

South Korea is also actively involved in the development of renewable energy sources. The country has introduced a portfolio of standards for renewable energy, which obliges energy suppliers to produce a certain amount of energy from renewable energy sources.

Methodology

The following methods were used in this study to assess the economic efficiency of using renewable energy sources in agrotourism:

1. Literature review: Existing scientific articles, government decrees, and other official documents were reviewed.
2. Statistical analysis: Energy cost reductions, job creation, and other economic indicators resulting from the use of renewable energy sources were analyzed.

¹ Types of Renewable Energy Sources | Inspire Clean Energy

<https://www.inspirecleanenergy.com/blog/clean-energy-101/types-of-renewable-energy-sources>

² PQ-3012-no. 26.05.2017. On the Program of Measures for the Further Development of Renewable Energy, Improving Energy Efficiency in Economic Sectors and the Social Sphere in 2017-2021

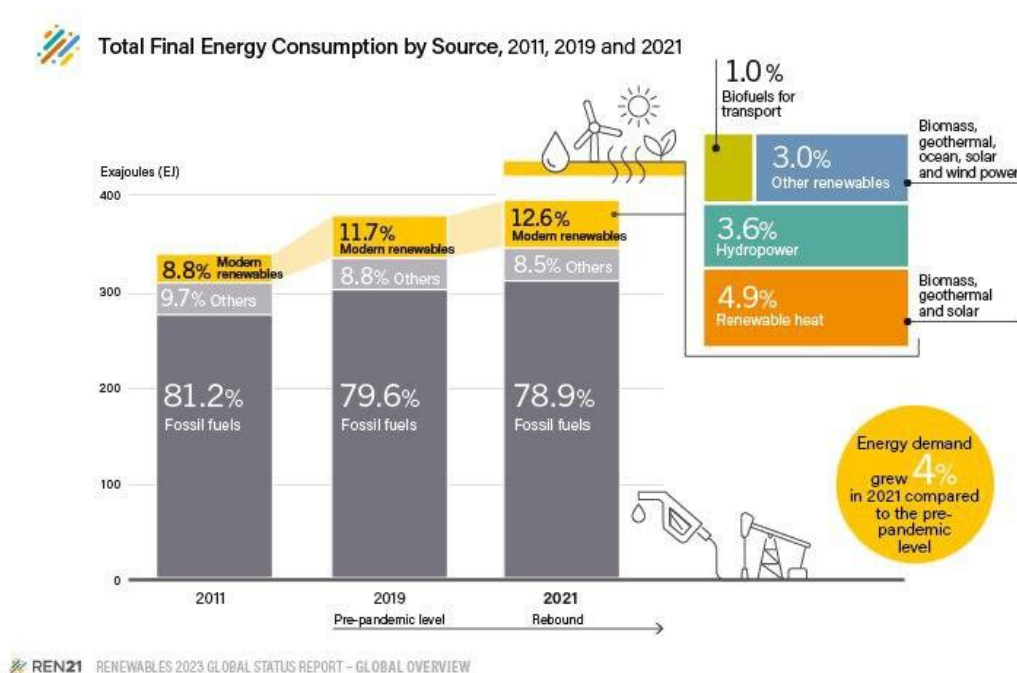
<https://lex.uz/docs/-3221894>

3. Charts and tables: Charts and tables were created based on the data obtained.

4. Study of foreign experiences: The experiences of countries such as Germany and South Korea in integrating renewable energy sources and agritourism were studied.

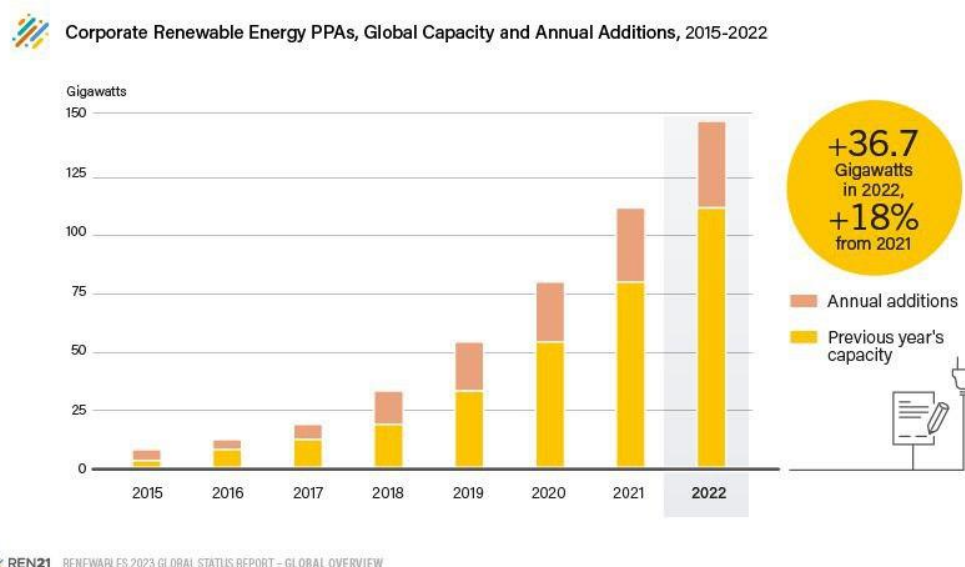
Discussion

To understand the economic importance of renewable energy sources and agritourism in improving energy efficiency in rural areas, we will review available statistical data and analysis. Renewable energy sources (RES) are playing an important role in global energy supply. From 2011 to 2021, the share of RE in global electricity supply increased from 20% to 28%, while the share of fossil fuels decreased from 68% to 62%. These changes indicate the economic efficiency of RES. As a result of measures taken to introduce renewable energy sources in Uzbekistan, 817.16 million cubic meters of natural gas, 447.0 million kWh of electricity, and 8.3 thousand tons of petroleum products were saved in the first half of 2022.³



1-diagram. Total finel energy consumption by source.(2011,2019,2021)

³ <https://minenergy.uz/uz/news/view/2612>



2-diagram. Corporate renewable energy PPAs, Global capacity and annual additions(2015-2022)⁴

Energy efficiency strategies include:

- IoT and monitoring systems: Using Internet of Things (IoT) devices to monitor and control energy consumption, continuously improving system efficiency.
- Insulation and reduced heat loss: Insulating buildings using energy-efficient construction methods reduces heat loss and increases energy efficiency.
- Integrated management systems: Connecting renewable energy sources to a single management system ensures their optimal operation.

Agrotourism contributes to economic growth in rural areas by creating new jobs, increasing demand for agricultural products, and developing infrastructure.⁵ For example, the development of agrotourism increases the number of jobs for skilled workers and leads to the development of the agrotourism sector in the regions. The use of renewable energy sources in agrotourism facilities can reduce energy costs, ensure environmental sustainability, and create an attractive environment for tourists. This has a positive impact on economic development in rural areas.

The use of renewable energy sources in agritourism provides a number of economic advantages in rural areas:

1. Reduction of energy costs: The use of renewable energy sources significantly reduces energy costs.

⁴ Renewables Global Status Report - REN21
<https://www.ren21.net/reports/global-status-report/>

⁵ Ergashboyev, M. J. o'g'li ., & Eshmuradov, U. T. (2024). O'ZBEKSTONDA AGROTURIZMNI RIVOJLANTIRISHNING TASHKILIY-USLUBIY ASOSLARI. INTERNATIONAL SCIENCES, EDUCATION AND NEW LEARNING TECHNOLOGIES, 1(11), 19–26. <https://doi.org/10.5281/zenodo.14518213>

2. Creation of new jobs: The development of renewable energy sources and agritourism creates new jobs.
3. Development of local infrastructure: The introduction of renewable energy sources contributes to the development of local infrastructure.
4. Environmental benefits: Renewable energy sources

However, a number of limitations may be encountered in their introduction, which are as follows:

1. Initial investment costs

Installing solar panels, wind turbines and biofuel systems requires significant capital. This investment can be difficult for small and medium-sized businesses involved in agritourism.

2. Limited technological infrastructure

In rural areas, energy networks and maintenance capabilities may be underdeveloped. Maintenance and lack of specialists for continuous operation of RES systems can be problematic.

3. Natural and geographical constraints

The efficiency of solar energy depends on the weather. Although suitable for areas with constant sunlight, it can be problematic in cloudy or mountainous areas. Wind turbines work effectively in areas with sufficiently high wind speeds. Biogas systems require sufficient organic waste.

4. Legal and financial barriers

Laws and subsidy programs related to QTE may be underdeveloped. The lack or complexity of government incentive mechanisms may discourage entrepreneurs from introducing this technology.

5. Acceptance level of local communities and tourists

Tourists may support the use of QTE, but in some cases, trust in traditional energy sources may be low. Local residents may be wary of QTE technologies and doubt their effectiveness.

6. Energy storage and transmission problems

In RES systems, energy production is not constant, for example, when the sun is not working at night or the wind is weak, the energy production will decrease. This requires energy storage systems (batteries), but their cost is high and their service life is limited.

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These energy sources can be implemented in the following agritourism facilities:

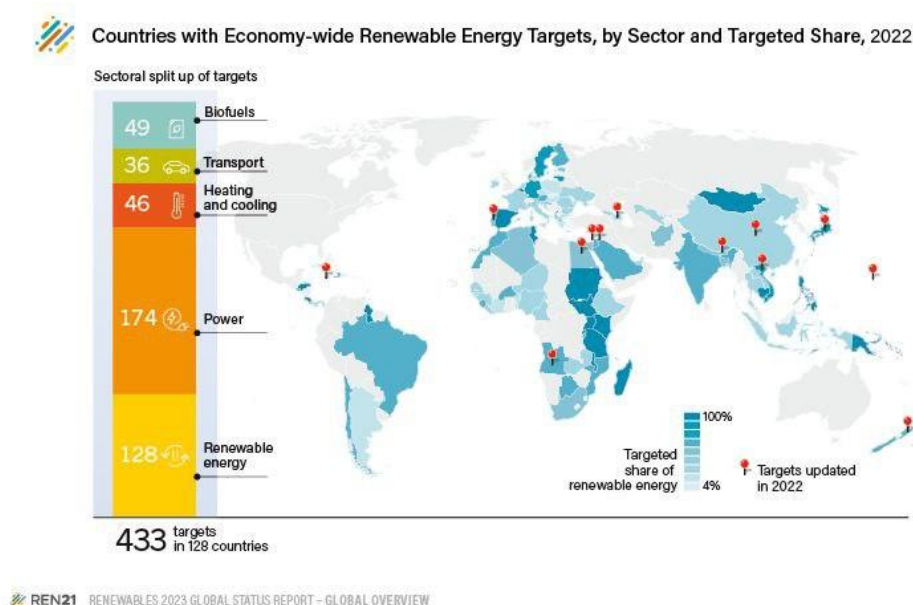
- Independent energy systems: Small farms, hotels or gardens in rural areas can use solar and wind systems to make themselves independent in terms of energy supply.

- Hybrid systems: Several renewable energy sources (such as solar and wind) can be combined to create uninterrupted energy supply and backup systems.
- Use of local resources: Biomass technologies support energy production using agricultural waste, which is also economically beneficial.

Results and analysis

The results of the study show that the use of renewable energy sources (RES) in agritourism can help increase economic efficiency in rural areas. The following aspects were studied and analyzed during the study:

1. Energy efficiency – As a result of the use of renewable energy sources, the electricity costs of agrotourism facilities have been significantly reduced. For example, farms that have installed solar panels have been able to reduce electricity costs by 40-50%.
2. Economic sustainability – The introduction of renewable energy sources in rural areas has allowed farms to create additional sources of income. This has been especially beneficial for agrotourism farms that offer environmentally friendly products to tourists.
3. Job creation – The development of renewable energy infrastructure has increased the level of employment in rural areas. As a result of the introduction of new technologies, new jobs have been created in the fields of technical maintenance, engineering and construction.
4. Development of local infrastructure – The use of renewable energy in agrotourism facilities has contributed to the improvement of infrastructure. For example, the issue of supplying electricity to remote areas has been solved by using wind and solar energy.
5. Environmental benefits - As a result of reducing the use of traditional fuels in rural areas, air pollution levels have decreased and carbon emissions have been reduced.



3-diagram. Countries with Economy-wide Renewable energy targets, by Sector and targeted share(2022)⁶

Foreign experience

International experience in the use of renewable energy sources shows that these technologies are not only environmentally friendly, but also economically effective.

German experience

Germany is one of the world's leading countries in the development of renewable energy sources. Solar and wind energy are widely used as part of the country's "Energiewende" program. As a result of the integration of agritourism and renewable energy infrastructure in rural areas, small farms have the opportunity to generate their own electricity and sell the surplus to the state grid.⁷

South Korean experience

In South Korea, special subsidies and tax breaks have been introduced to encourage the production of renewable energy. The use of environmentally friendly energy sources in the agritourism sector is supported by the state, which has led to the development of sustainable tourism in rural areas of the country.⁸

Chinese experience

Projects for the widespread use of solar energy are being implemented in rural areas of China. In particular, the Chinese government has improved electricity supply by installing solar panels in rural areas as part of the "Solar Village" program. Such projects also contribute significantly to the development of the local economy.⁹

Application opportunities in Uzbekistan

- ✓ A number of economic and environmental results can be achieved by integrating renewable energy sources with agrotourism in rural areas of Uzbekistan. The following factors are important for the successful implementation of this process:
- ✓ High level of sunlight - Uzbekistan has a great potential for using solar energy.
- ✓ Development of agriculture - Farms and agrotourism facilities can increase economic efficiency by using renewable energy.
- ✓ State support - Government decisions and programs on the development of renewable energy sources ensure the future success of this sector.

Conclusion

⁶ Renewables Global Status Report - REN21

<https://www.ren21.net/reports/global-status-report/>

⁷ <https://www.bmu.de/en/topics/climate-adaptation/energy-efficiency/renewable-energy>

⁸ : Korea.net : The official website of the Republic of Korea

<https://www.korea.net/>

⁹ IEA – International Energy Agency

<https://www.iea.org/>

The use of renewable energy sources in agrotourism plays an important role in increasing energy efficiency and ensuring economic stability in rural areas. This not only helps to reduce energy costs, but also creates new jobs, develops local infrastructure and improves the ecological environment. Foreign experience shows that for the effective implementation of these technologies, state support, investments and widespread introduction of modern technologies are necessary.

In the future, it would be appropriate to develop sustainable development strategies in rural areas of Uzbekistan by expanding the use of renewable energy sources and integrating them with agrotourism. The following proposals are made for this:

- State support: The state should provide subsidies and tax incentives to encourage the use of renewable energy sources. For example, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 452 dated July 23, 2020 established measures for state accounting of renewable energy sources and energy generated from them.¹⁰
- Advanced training: It is necessary to organize trainings to improve the knowledge and skills of representatives of the agrotourism sector on renewable energy sources.
- Information campaigns: Information campaigns should be conducted to inform the public about the advantages of renewable energy sources.
- Cooperation: It is necessary to develop cooperation between companies operating in the field of renewable energy and agrotourism facilities.

References:

1. PQ-3012-no. 26.05.2017. On the Program of Measures for the Further Development of Renewable Energy, Improving Energy Efficiency in Economic Sectors and the Social Sphere in 2017-2021 <https://lex.uz/docs/-3221894>
2. No. 452 dated 23.07.2020. On measures for maintaining state accounting of renewable energy sources and energy generated from them <https://lex.uz/ru/docs/-4909794>
3. United Nations Development Programme (UNDP). The Outlook for the Development of Renewable Energy in Uzbekistan. https://www.undp.org/sites/g/files/zskgke326/files/migration/uz/uzb_un_uzb_4_The_Outlook_for_the_Development_of_Renewable_Energy_in_Uzbekistan.pdf
4. Types of Renewable Energy Sources | Inspire Clean Energy <https://www.inspirecleanenergy.com/blog/clean-energy-101/types-of-renewable-energy-sources>
5. <https://minenergy.uz/uz/news/view/2612>
6. Renewables Global Status Report - REN21 <https://www.ren21.net/reports/global-status-report/>
7. Germany's Renewable Energy Act. <https://www.bmu.de/en/topics/climate-adaptation/energy-efficiency/renewable-energy>
8. South Korea's Renewable Energy Policy. Korea.net : The official website of the Republic of Korea <https://www.korea.net/>

¹⁰ No. 452 dated 23.07.2020. On measures for maintaining state accounting of renewable energy sources and energy generated from them <https://lex.uz/ru/docs/-4909794>



9. China's Solar Energy Initiatives. IEA – International Energy Agency
<https://www.iea.org/>
10. Ergashboyev, M. J. o'g'li ., & Eshmuradov, U. T. (2024). O'ZBEKSTONDA AGROTURIZMNI RIVOJLANTIRISHNING TASHKILIY-USLUBIY ASOSLARI. INTERNATIONAL SCIENCES, EDUCATION AND NEW LEARNING TECHNOLOGIES, 1(11), 19–26. <https://doi.org/10.5281/zenodo.14518213>
11. Ergashboyev, M. J. o'g'li ., & Eshmuradov, U. T. (2025). AGROTURIZM – QISHLOQ XO'JALIGIDA YANGI DAROMADLAR KALITI. INTERNATIONAL SCIENCES, EDUCATION AND NEW LEARNING TECHNOLOGIES, 1(12), 36–41. <https://doi.org/10.5281/zenodo.14601764>
12. Agritourism Development In Italy And New Zealand: A Comparative Analysis And Implications For Uzbekistan | American Journal of Advanced Scientific Research
<https://search.app/dvBv3QmTB1TE3WhVA>
13. N.T.Toshpo'latov, D.B.Qodirov. Renewable Energy Sources
<https://staff.tijame.uz/storage/users/748/books/tOnSLwigSTquMNXQpnibZS3xtH41rnqSVwBkZG0H.pdf>