



The Potential and Challenges of Green Energy in Georgia: Lessons from other Countries

Maia Melikidze^{1*}, Otar Nadiradze² and Garik Teymurazyan³

¹Associate professor at BTU, Founder of RES LAB (Renewable Energy Sources Laboratory), Georgia

²Researcher, RES LAB, Business and Technology University, Georgia

³Researcher, Deputy Director at RES LAB, Business and Technology University, Georgia

*Corresponding author: Maia Melikidze, Associate professor at BTU, Founder of RES LAB (Renewable Energy Sources Laboratory), Georgia

Received: 📅 September 7, 2023

Published: 📅 September 15, 2023

Abstract

Energy is an important part of our daily lives. With the growth of the world's population, the demand for energy is increasing dramatically. Energy is needed to make any device work. The escalating demand for energy is resulting in an ecological disaster, which is already evident in everyday life in the form of earthquakes, climate change or global warming. Consequently, it is imperative to explore and implement clean energy sources. The objective of this paper is to assess the extent of government involvement in promoting green energy, its feedback on the advantages of green energy, the resources it possesses for generating renewable energy, and the specific measures it is undertaking for its implementation. To accomplish the research objective and obtain conclusive results, instances from African and Asian nations were examined. A qualitative study was conducted to provide insight into the situation in Georgia, which involved the participation of three representatives from the energy sector. The study revealed the following findings: the government is actively engaged in promoting green energy and the country possesses the requisite natural resource potential. Various reforms are being implemented to attract investors and raise public awareness. The primary interest in green energy in Georgia stems from the private sector.

Keyword: Green Energy; Renewable Energy; Natural Resources

Introduction

The global population's growth is accompanied by a continuous increase in energy demand. It is difficult to envision our life without the use of various electronic devices, internet connectivity, and transportation, all of which are crucial factors in creating a comfortable living environment. Energy is needed to create this comfort, and as the population grows, the demand for energy increases proportionally. The growing demand for energy has resulted in global environmental issues, including climate change, air pollution, soil degradation, acid rain, and poor waste management, etc. These factors not only have a negative impact

on the Earth but also cause significant harm to human health. This research is significant because it focuses on the example of Georgia, allowing us to understand the role that the country plays in the implementation of green energy. As the world's leading countries shift to green energy consumption and seek to replace traditional energy sources with green energy, Georgia's participation in this global process will have a significant impact on the country's development and will make a small but meaningful contribution to the creation of an ecologically clean and green world. The objective of the research is to assess Georgia's feedback on the advantages

of green energy, its impact on the development of the Georgian economy, and the measures the government intends to take in the future to implement and promote renewable energy.

Results and Analysis

As our awareness of the impact, we have on the ecosystem grows, so does our conviction that it is necessary to seek alternative, clean sources of energy. The contemporary world is gradually becoming aware of green energy and making efforts to utilize it. The introduction of this new concept has also brought with it new opportunities to create an environmentally healthy habitat.

Africa and Green Energy

Globally, over 25% of the population is facing an energy shortage, particularly in rural areas of developing countries. The majority of those affected by energy shortages are located on the African continent. On average, more than 600 million people in Africa live without electricity. Energy consumption is a crucial need for every country. Bioenergy and solar energy are currently increasing their penetration in many African countries. However, the main challenge is developing the technology required for energy use and, most importantly, securing the necessary funding (Jianguo Du [1]). Africa is abundant in renewable energy resources, particularly the Sahara region, which has exceptional potential for solar and bioenergy production. That is why Africa is called “the continent of the sun”. However, two-thirds of the population, more than 620 million people, are still without electricity, and 730 million are still dependent on solid biomass. Most of the continent is in the equatorial region, where the intensity and power of the sun’s rays are always high. Arid and semi-arid forests are in the northern part of the region. The combination of Africa’s geographical and climatic factors results in a vast potential for solar energy production. However, harnessing this potential requires expensive and large-scale infrastructure development (Jianguo Du [1]). Economics and management researchers from Taiwan conducted a study using Ghana as an example to confirm their results. They used a mediation model to determine the indirect effects of renewable energy use on economic growth in the African region. Their findings showed that renewable energy use, as an independent variable, has a significant direct impact on economic growth in Africa. The use of renewable energy has been shown to have a significant impact on attracting foreign investment, promoting economic growth, and increasing capital accumulation (Justice Gyimah [2]).

Hydroelectric plants are the main source of electricity generation in Ethiopia. The Grand Ethiopian Renaissance Dam, which began its second filling phase in July 2020, will be able to generate 6,450 MW and become one of the largest hydropower dams in Africa. Morocco has set a goal to generate 52% of its electricity from renewable energy sources by the year 2030 (The International Hydropower Association (IHA) [3]). Development finance institutions have shown a strong interest in addressing the need for electrification and empowerment in Africa. The African Development Bank has made energy a central part of its economic transformation agenda.

Between 2016 and 2020, the bank invested over US\$12 billion in the energy sector (African Development Bank [4]). In the past decade, the World Bank has provided approximately \$2.3 billion in funding for infrastructure and reform initiatives to support the West African Energy Fund. In June 2021, The World Bank allocated US\$465 million to expand access to energy and integrate renewable energy sources in West Africa (The World Bank 2021). The Government of Mali supports several projects whose expected or estimated impact will significantly contribute to the introduction and development of green energy. The World Bank has largely supported Mali’s efforts to promote the use of renewable energies and improve access to quality electricity services in rural areas. These new technologies should allow the country to take an important step in its energy sector by focusing on renewable energies (The World Bank 2019).

China and Green Energy

China ranks among the most polluted countries in the world according to environmental indicators. However, it is taking significant steps towards transitioning to green energy. Over the past 20 years, China has emerged as a global leader in energy innovation, particularly in the areas of solar energy and electric vehicles. China aims to become a technological innovator in renewable energy. As the International Energy Agency (IEA) writes, the state and governments play an important role in the promotion of clean energy and its success. China has started to make significant investments in solar and wind energy, including the construction of photovoltaic power plants, wind turbines, and battery storage facilities, as well as the production of electric vehicles. China is trying to reduce carbon emissions by introducing new technologies (IEA [5]). In September 2020, Chinese President Xi Jinping announced a plan for an “energy revolution” and a commitment to fighting pollution. This policy focuses on electricity, natural gas, and much cleaner technologies. Gradually, China’s energy needs are increasingly being met by renewable energies. Between 2019 and 2024, China has set a goal to increase the share of renewable energy in its global capacity to 40%. According to the International Energy Agency, China aims to overtake the European Union and become a leader in green energy and plans to increase the global production of biofuels. However, China’s coal demand and production volume remain high. Currently, a quarter of a ton of coal used globally is burned to generate electricity in China. The government is trying to reduce emissions and improve air quality by switching to gas in the industrial and residential sectors, but China’s coal-fired plants are young, efficient, and still ten times larger than its gas-fired plants (IEA [6]).

As we read in an article published by Columbia University, China leads the world in the use of solar energy. It holds more than one-third of the world’s solar energy. At the end of 2018, China had more than 175 GW of solar power. In 2018, solar energy accounted for about 3% of China’s electricity generation and 9% of China’s electricity capacity. In December 2018, a 500 MW solar project in Qinghai became the first in China to sell solar electricity at a price lower than coal-fired electricity (Columbia University in

The City Of New York [7]). According to an article published by the Harvard University of Engineering and Applied Sciences, by the year 2060, solar energy could potentially meet 43.2% of China's energy demand, at a future cost of no more than 2.5 cents per kWh. By comparison, coal electricity tariffs in China ranged from 3.6 to 6.5 cents per kilowatt hour in 2019 (Burrows [8]). In a BBC article, we read that China is the largest producer of solar panel technology in the world. According to the International Energy Agency (IEA), more than 60% of the world's solar panels are made in China. Therefore, the government has a clear economic interest in ensuring the large demand for solar panels. The IEA notes that China has met its goal of increasing solar power capacity. China is ready to encourage infrastructure investment in and around Tibet. Some argue that such investment is partly politically motivated - to strengthen Chinese authority and support ethnic Chinese who have moved to these areas. According to an article, Panda Green Energy, a company that built panda-shaped solar panel arrays in Datong, has plans to install many more solar farms throughout China. The goal of these installations is to promote and increase demand for green energy (Baraniuk [9]).

Hydropower is one of the most common sources of energy in China. "Three Gorges Dam" is the number one largest hydroelectric power plant in China, built on the Yangtze River and capable of generating 22,500 MW of electricity (Water Science School 2018) [10].

Georgia and Green Energy

Like many other countries, Georgia is also facing the challenge of finding ways to use energy resources efficiently while minimizing harm to the environment. That is why it is necessary for the country to gradually introduce a green economy. Educational institutions in Georgia are making efforts to switch to renewable energy sources. In 2021, 13 public schools in Batumi were equipped with solar panels. The small power generation facilities installed in these schools are part of a net metering program, which allows the schools to use all the electricity they generate [11]. Mego.ge is one of the first businesses that decided to use green energy to run their business. After the electricity tariff increased, the company decided to turn to alternative sources of energy to reduce costs, and for this purpose, it decided to use solar energy. The company created a detailed plan for the solar power plant, including all the necessary information. They decided to use green financing from the GEF program. After careful analysis, it was determined that the 88-kW solar power plant would help mego.ge save 111 MWh of electricity per year. The plant was planned to be installed on the roof. By investing \$36,700 in the solar power plant, the company will save over \$11,000 per year [12]. The investment will pay for itself in just over three years. And after the money is returned in full, the savings will be used by the company for various purposes.

As electricity costs rise, more and more businesses are choosing to switch to alternative energy sources to save money and improve their efficiency. In 2021, the Bank of Georgia established an energy credit program to support the development of eco-friendly power

plants and assist businesses [13]. This project helps to lower utility expenses while also allowing us to protect the environment. Both the state and private sectors in Georgia are increasingly participating in the adoption of green energy and the shift to alternative energy sources, which will have a positive impact on the environment in the future. However, more events, informational meetings, and campaigns with the private sector are necessary [14].

Research Methodology and Interpretation

The research used a qualitative method, specifically in-depth interviews with experts in the field. The research found that the private sector is showing a strong interest in developing hydro, solar, and wind power plants. The Ministry of Economy and Sustainable Development of Georgia constantly receives various investment proposals for the use of renewable energies. It was also observed that the demand for solar energy in Georgia has been steadily increasing since 2021 [15]. The commercial sector is the primary customer for solar energy because, after the commercial electricity tariff increased to about 0.32 GEL per kWh, the payback period for solar investments decreased to 4.5-6 years. It is important to ensure that the project uses high-quality products. Supermarkets and other retail businesses often have significant electricity expenses. For commercial organizations that want to switch to renewable energy, the main challenge is finding enough space for the equipment. Another challenge is the 500-kW limit of the net metering program. According to the research participants, Georgia has the potential to produce clean energy. The country has wind, solar and hydropower resources that can be used to generate clean energy.

The level of education about green energy utilization is gradually increasing in Georgia. Although this area is still unregulated, state representatives are making efforts to share their knowledge and experience with the private sector to increase interest in clean, renewable energy. This is being done through various events and seminars. Representatives of the private sector are making efforts to learn more and increase their knowledge about renewable energy [16].


Georgia has already taken steps to promote green energy and is making progress in introducing renewable energy sources through small but effective measures. Georgia has implemented a net metering system that permits customers to install micro power plants with a capacity of up to 500 kW and generate their own electricity. This is a significant step towards promoting green energy. The study found that it is important for Georgia to utilize various types of renewable resources, with hydropower being particularly important, even though wind energy is more widely used globally. However, all types of energy have their unique roles depending on the season. The study found that Georgia does not have a wide range of incentive mechanisms to attract investors, but the country is making efforts to create a favourable environment for renewable energy by acquiring knowledge and experience and offering optimal options [17,18].

Conclusion

As the global population grows, the demand for energy is also increasing rapidly, which is a major factor contributing to global problems. Global warming, air pollution, climate change, acid rain, and soil erosion are not only harmful to human health but also have a significant negative impact on the environment. Therefore, it is necessary to switch to alternative, clean sources of energy. Countries have realized the importance of using their natural resources to generate clean and renewable energy to reduce costs and minimize harm to the environment. Consequently, the significance of green energy is increasingly relevant. The study has demonstrated that many countries, including Georgia, consider switching to green energy as a top priority. They are working hard to attract investors by creating favourable conditions quickly, to contribute to global well-being and prevent an environmental catastrophe on our planet [19].

References

- Du Jianguo, Guanghui Chang, Daniel Adu, Agnes Abbey, Ransford Darko, et al. (2021) Development of solar and bioenergy technology in Africa for green development-Addressing barriers and untapped potential 5(7): 506-518.
- Gyimah Justice, Xilong Yao, Mark Awe Tachega, Isaac Sam Hayford, Evans Opoku-Mensah, et al. (2022) Renewable energy consumption and economic growth: new evidence from Ghana. Volume 248.
- Ethiopia - Grand Ethiopian Renaissance Dam (GERD). The International Hydropower Association (IHA).
- (2019) Estimating Investment Needs for the Power Sector in Africa 2016-2025. African Development Bank Group.
- (2022) Tracking Clean Energy Innovation: Focus on China. The International Electry Agency (IEA).
- (2019) The International Electry Agency (IEA). China.
- Guide to Chinese Climate Policy. Columbia University in The City Of New York.
- Burrows, Leah (2021) China's solar-powered future-Solar energy can be cheap and reliable across China by 2060. Harvard John A. Paulson School of Engineering and Applied Sciences.
- Baraniuk, Chris (2018) China is not only home to some of the biggest solar farms; its technology looks set to influence energy policy across the globe. But how feasible are these grand plans? BBC.
- (2013) Renewable energy sources and energy efficiency. Giorgi Mukhigulishvili, Tuthana Kvaratskhelia, Tbilisi.
- Aglionby, John (2017) Kenya shows renewables scope to plug Africa's power supply gaps. Financial Times.
- (2020) Angola - Angola Renewable Energy Program - Enabling Environment-SEFA Appraisal Report. African Development Bank Group.
- Light Up and Power Africa – A New Deal on Energy for Africa. African Development Bank Group.
- (2022) China's Solar Power Growth to Soar in 2022 on Project Pipeline. Bloomberg.
- (2021) 13 public schools of Batumi were equipped with solar power plants. Business Media Georgia.
- FAO Regional Office for Latin America and the Caribbean. Forest loss slows in South America, protected areas rise. Food And Agriculture Organization of the United Nations.
- Green Economy Financing Facility. Beneficially used solar energy.
- (2022) GCF Spotlight: Africa. Green Climate Fund.
- (2021) Renewables Integration in India. The International Electry Agency (IEA).

 This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: [Submit Article](#)

DOI: [10.32474/JBRS.2023.02.000143](https://doi.org/10.32474/JBRS.2023.02.000143)




Journal of Biosensors
& Renewable Sources

**Open Access Journal of Biosensors
& Renewable sources**

Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles