

SOLAR POWERED IRRIGATION, A CONDUIT TO UGANDA'S MIDDLE INCOME STATUS

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Article History

Received: 18.10.2023

Accepted: 26.10.2023

Published: 15.11.2023



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EXECUTIVE SUMMARY

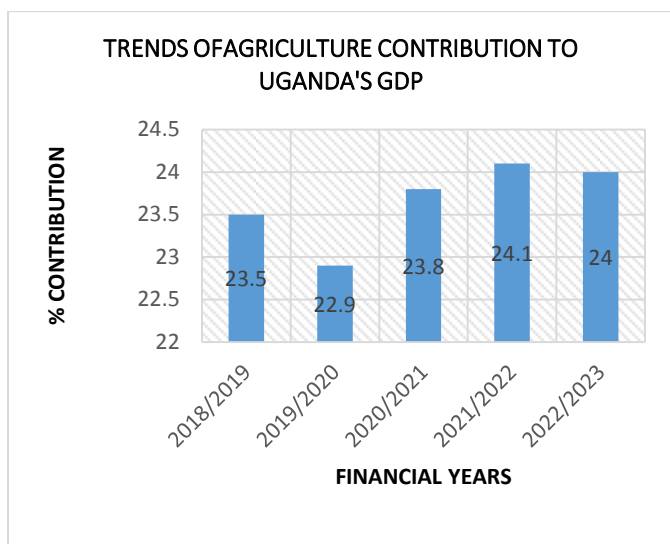
The policy brief highlights following: -

- The contribution of Agriculture towards Uganda's economic development
- The social-economic benefits of Solar-powered irrigation system towards the various stakeholders, based on previous research observations
- The Intervention that the government of Uganda is under taking to ensure a wide spread adoption of this technology

In conclusion, it was worth noting that to fully realize the potential of these irrigation systems, it is crucial to address challenges related to financing, technical capacity, and policy support.

INTRODUCTION

Agriculture is a critical sector in Uganda's economy, accounting for about 23% of the country's Gross Domestic Product (GDP) and employing over 70% of the population (UBOS, 2019)



In recent years, solar-powered irrigation systems have emerged as a promising solution to address the energy and water constraints faced by farmers in Uganda. These systems utilize solar energy to power water pumps, allowing farmers to extract and distribute water for irrigation purposes. Solar energy is abundant in Uganda, with high solar radiation levels throughout the year (Kisaalita et al., 2020). Harnessing this renewable resource offers an opportunity to enhance agricultural productivity, improve water management, and promote sustainable rural development.

PREVIOUS RESEARCH OBSERVATIONS

Solar-powered irrigation systems offer numerous advantages over traditional irrigation methods. By using clean and renewable energy, these systems mitigate greenhouse gas emissions and reduce dependence on costly fossil fuels (Maroyi, 2020). Additionally, solar-powered irrigation systems can provide farmers with a reliable and continuous source of energy, ensuring consistent access to water for crop irrigation (Banda et al., 2019). This technology empowers farmers to extend their growing seasons, cultivate high-value crops, and enhance their resilience to climate change impacts.

The adoption of solar-powered irrigation in Uganda can have far-reaching benefits. Improved agricultural productivity can contribute to food security, poverty reduction, and rural livelihood improvement (Rural Electrification Agency [REA], 2018). Furthermore, solar-powered irrigation can promote sustainable water resource management, minimizing water stress and optimizing water usage through efficient irrigation techniques like drip irrigation (Kato et al., 2021).

BENEFITS OF THE INTERVENTION

Increased Productivity:

Solar-powered irrigation systems allow farmers to extend their growing seasons, increase crop yields, and diversify their agricultural practices.

Cost Savings:

Solar energy eliminates the need for expensive fuel and reduces operational costs, making irrigation more affordable for smallholder farmers.

Environmental Sustainability:

Solar-powered irrigation contributes to climate action by reducing greenhouse gas emissions associated with fossils, and promotes sustainable agricultural practices.

Water Resource Management:

Solar-powered systems can be coupled with efficient irrigation techniques (e.g., drip irrigation) to optimize water usage and reduce water stress.



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LIMITATIONS OF THIS TECHNOLOGY

Upfront Investment:

Initial costs associated with solar-powered irrigation systems may pose financial barriers for small-scale farmers. Innovative financing mechanisms and subsidies can help overcome this challenge.

Technical Expertise:

Building local capacity for installation, maintenance, and repair of solar-powered systems is essential to ensure their long-term sustainability.

Infrastructure and Support:

Adequate infrastructure, such as water storage facilities, is necessary to optimize the benefits of solar-powered irrigation. Additionally, extension services and farmer training programs are crucial for knowledge dissemination and proper system utilization.

GOVERNMENT INTERVENTIONS

At least 2.6 million Ugandans in the water-stressed districts will benefit from the solar-powered irrigation sites that the government of Uganda is putting in place around the nation.

To build these irrigation sites, the government hired Nexus Green, a cutting-edge worldwide solar energy firm that specializes in planning, supplying, producing, and delivering cost-effective solar-powered solutions that cut carbon emissions and provide cheaper, cleaner energy.

By the end of 2024, the company hopes to have finished all

construction work on up to 687 solar-powered water irrigation sites in Uganda and hand the project over to the government

POLICY RECOMMENDATIONS

Renewable Energy Policies:

Implement policies that promote the adoption of solar-powered irrigation systems, including incentives and subsidies for equipment purchase and installation. This can include tax incentives, grants, or favorable loan conditions to make solar powered irrigation systems more affordable for farmers.

Financial Support:

Establish innovative and appropriate financing mechanisms and partnerships with financial institutions to facilitate access to affordable credit for farmers and promote investment in solar-powered irrigation. This can involve innovative and concessional financing instruments such as grants, partial credit guarantees, among others.

Capacity Building:

Enhance technical skills and knowledge through training programs for farmers, technicians, and extension workers to ensure effective utilization, maintenance, and repair of solar-powered irrigation systems. This can involve organizing workshops, training sessions, and demonstration farms to educate stakeholders about the benefits and proper use of solar-powered irrigation technologies.

Research and Development:

Encourage research and development initiatives to improve the efficiency, affordability, and durability of solar-powered irrigation technologies, tailored to the specific needs of Ugandan farmers. This can include funding research projects, collaborating with academic institutions and technology providers, and supporting innovation hubs focused on renewable energy and agriculture

Collaboration and Coordination:

Foster collaboration among government agencies, development partners, private sector actors, and farmer organizations to create a supportive ecosystem for solar-powered irrigation implementation and monitoring. This can involve establishing multi-stakeholder platforms, creating partnerships between public and private sectors, and leveraging the expertise and resources of development organizations to support the widespread adoption of solar-powered irrigation.

Monitoring and Evaluation:

Implement a robust monitoring and evaluation framework to assess the impact of solar-powered irrigation systems on agricultural productivity, water resource management, and rural development. This can involve setting up data collection mechanisms, conducting regular assessments, and using the findings to inform policy adjustments and improvements.

Policy Integration:

Ensure that policies related to renewable energy, agriculture, water management, and rural development are integrated and aligned to create a favorable environment for the adoption of solar-powered irrigation. This can involve cross-sectoral coordination, policy coherence, and avoiding conflicting regulations or incentives

By incorporating renewable energy solutions into the agricultural sector, Uganda can harness its abundant solar resources to drive sustainable agricultural development, enhance food security, and uplift rural communities.

REFERENCES

1. Banda, C. M., Msiska, F. B. M., & Kamanga, J. (2019). Assessment of Solar Powered Irrigation Systems in Mitigating the Impact of Climate Change on Smallholder Farmers in Sub-Saharan Africa: A Review. *Renewable and Sustainable Energy Reviews*, 113, 109264.
2. Food and Agriculture Organization of the United Nations (FAO). (2010). *Sustainable Agriculture and Rural Development Brief: Biomass Energy*.
3. Kato, E., Njuki, J., & Ambuko, J. (2021). The Role of Solar-Powered Irrigation in Enhancing Smallholder Farmer Resilience to Climate Change in Sub-Saharan Africa. *Climate*, 9(1), 9.
4. Kisaalita, W. S., Bakashaba, C. G., Nampala, P., & Nkoyoyo, E. (2020). Review of Solar Irrigation Systems for Sub-Saharan Africa: An Opportunity for Smallholder Farmers. *Energies*, 13(10), 2474.
5. Maroyi, A. (2020). The Role of Solar Energy in Enhancing Food Security in Sub-Saharan Africa. *Foods*, 9(2), 165.
6. Rural Electrification Agency. (2018). *Rural Electrification Strategy and Plan 2013-2022*. Retrieved from <https://rea.or.ug/wp-content/uploads/2018/11/Rural-Electrification-Strategy-and-Plan-2013-2022.pdf>
7. UBOS. (2020). *Agriculture*. Uganda Bureau of Statistics. Retrieved from <https://www.ubos.org/sectors/agriculture/>
8. Uganda Bureau of Statistics (UBOS). (2019). *Statistical abstract*. Kampala, Uganda: UBOS.
9. World Bank. (2019). *Uganda: Agriculture Public Expenditure Review*. Retrieved from <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/447->