



Solar-Powered Irrigation in Semi-Arid Ethiopia: Economic Viability and Technological Adaptation Assessments

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Abstract

Solar-powered irrigation systems are increasingly being deployed in semi-arid regions of Ethiopia to enhance agricultural productivity and sustainability. A mixed-methods approach combining quantitative data analysis with qualitative interviews was employed to assess system performance and user acceptance. Solar energy generated an average of 20% more than initially anticipated, significantly reducing operational costs for farmers in the region. The study concludes that solar-powered irrigation systems are economically viable and technologically adaptable for semi-arid Ethiopian farming communities. Government policies should prioritise subsidies and training programmes to facilitate wider adoption of these technologies.

Keywords: *Ethiopia, Semi-arid Regions, Solar-Powered Irrigation, Economic Viability, Technological Adaptation, Renewable Energy Deployment, Mixed-Methods Approach*

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